FIRE PROTECTION & PREVENTION

Eng. Salim Ali Al Harthy

BSc Electrical Engineering (USA), MSc (Mechanical Industrial Engineering –SQU Oman)

FIRE PROTECTION & PREVENTION

Author :

Eng. Salim Bin Ali Al Harthy.
BSc Electrical Engineering (USA),
MSc (Mechanical Indusrial Engineering - SQU Oman)

Contact Detail :

Tel No : 99376453
Email : salimalharthi@hotmail.com

Published by :

Synergy Advertising & Publishing a Div. of Al Rawahy Group of Co.

Design and layout :
Synergy Advertising & Publishing

MOI: 2021/105927

Copyright © Eng. Salim Bin Ali Al Harthy.
First Published 2021

All rights reserved. No part of this publication may be reproduced in any material form (including photocopying or storing in any medium by electronic means) without written permission of the copyright holder. Any person acting in contravention of the copyright law will be liable to criminal prosecution and civil claims for damages.

INTRODUCTION

The discovery of fire by humans is considered one of the major steps in the Human evolution, which makes fire a necessity for human development and existence on earth. Like all the other natural elements, fire comes with its perils, threats and damages, if it is not handled carefully, it can lead to loss of lives, destruction and catastrophic Impact. Fires can affect people, property, and the environment, in some cases, the resulting losses are extraordinary, causing hundreds of deaths, widespread damage to properties and significant impacts to the environment.

The only way to manage the effect of fire is to create awareness and have preventive and protective measures in place. Hence, the launch of “Fire Protection and Prevention” book is specially focusing on Fire protection and prevention measures for various places like workplaces, public gatherings, and home. I believe, particularly, it is important to teach young children the importance of Fire safety, so they behave responsibly as an adult when dealing with fires.

The main objective of this book is to create fire safety awareness about the preventive and protective measures for different locations which include industries, buildings, and public places. It is written in a simple format which, I believe, will be easy to follow and to refer to.

I hope the information provided in the book will create awareness and help to establish a fire prevention and preparedness program, which can help to avoid injuries to employees, visitors, and damages to the establishment property as the rate of fires has increased due to many reasons such as globe warming, and other man-made causes.

“Fire Protection and Prevention” is reviewed and approved by The Civil Defence and Ambulance Authority (CDAA), which are the regulatory body in Oman for Fire Protection and Prevention.

Disclaimer

The content displayed in this book is merely for educational and informational purposes. It is not intended as a substitute for professional advice. While the information has been verified, we cannot guarantee that there are no mistakes or errors. The publisher and author are not responsible for any specific practices related to the subject discussed which needs and may require specific supervision and are not liable for any damage or negative consequences from any treatment, action, application or preparation, to any person reading or following the information in this book. References are provided information purpose only and do not constitute endorsement of any website or other sources.

About the Author

Qualification:
Bachelor in Electrical Engineering (USA), Master in Industrial Engineering - Sultan Qaboos University,

Member of:
member of many professional organizations and partnership councils with some universities in the Sultanate of Oman and abroad.

Experience:
He worked in the field of Engineering, Maintenance, Firefighting, Operation, Health, Safety and Environment in the Oil and Gas sector, Refinery and Petrochemicals and Airports Operation and Management.

Speaker:
A speaker at many national and international conferences in the fields of engineering, maintenance, management, health, safety and the environment.

Author:
Eng. Salim Ali Al Harthy
BSc Electrical Engineering (USA), MSc (Mechanical Industrial Engineering - SQU Oman)

Other Books:
A Generalized Occupational Health & Safety Manual
Near Miss Reporting

CONTENTS

FIRE SAFETY 7

FIRE 8

TYPES AND CLASSES OF FIRE 10

FIREFIGHTING EQUIPMENTS 12

FIRE PREVENTION, FIRE PROTECTION AND FIRE FIGHTING 22

WORKPLACE FIRE SAFETY 23

OFFICES 27

FIRE SAFETY AT FACTORIES AND WORKSHOPS 31

FIRE PROTECTION FOR OIL AND GAS WORKSITES 36

FIRE SAFETY IN COMMERCIAL BUILDINGS 40

PROTECTING CINEMAS & PLACES OF PUBLIC ASSEMBLY 42

FIRE SAFETY AT SCHOOL AND COLLEGES 45

FIRE SAFETY AT RESIDENTIAL BUILDING 49

FIRE SAFETY AND EVACUATION AT HOSPITALS 57

AGRICULTURAL FIRE SAFETY 63

VEHICLE FIRES AND HOW TO PREVENT THEM 65

KEEP CHILDREN SAFE FROM FIRE AND BURN 69

FIRST AID AFTER A FIRE ACCIDENT 72

EMERGENCY NUMBERS 80

FIRE SAFETY

Fire is universally accepted as important to human life, it was regarded as the greatest discovery made by humanity, and in the technological evolution in the growth of civilization. Fire provided warmth and light, protected humans from predators, and helped in creating better tools for hunting and method of cooking. The use of fire as the source of energy in technological development and the realization that fire, when it becomes out of control can be devastating to human life and property created the need to control the fire and be responsible around it. Over the years the study of fire and its hazards are given us a wealth of knowledge in preventing, protecting, and fighting a fire most efficiently. These guidelines are scientific and well-proven. Following them can benefit in saving people's lives as well as loss of properties. Each place requires a different kind of safety measure depending on the location, the people, and the nature of work, hence it is important to follow safety measures not only at the workplace but also everywhere in day-to-day life.

Hazards and dangers exist everywhere, be it at home, workplace, or public places. When it comes to handling hazard, awareness is a keyword. Being aware of these hazards and having safety behaviors in our everyday life can prevent many tragic incidents.

The objective of this fire safety guide is to create awareness on fire prevention, fire protection, and safe practices at the home, various workplaces, educational institutions (school and colleges), and public commercial places. Every safety practice involves human behaviors, hence creating awareness among children will be a valuable investment for the future generation.

Any fire, if it turns into an accident can be devastating even it started small. Burnings, injuring, and even affecting people, damaging properties, equipment, and livelihood can be really damaging to people involved. So fire prevention is a better way to minimize the loss that could affect lives or businesses. A plan for fire prevention and fire protection for workplace or home should always be there, which can minimize the effect of the fire.

The fire hazards are universal in their destruction, however, vary from country to country depending on the local climate, social behavior, and the local industries, etc.

In Oman and the Gulf states, the high temperature, especially in the summer months can heighten the chance of fire accidents. It is common, universally, for the number of fire incidents to increase in the summer. A fire prevention plan in place can minimize these incidents. Safe practices have to be implemented and maintained at all times as a preventive action and also have a fire protection system in place, including adequate numbers of firefighting appliances, as recommended by the The Civil Defence and Ambulance Authority (CDAA) and installed and maintained in operating condition at all times.

Most fires are preventable. Those responsible for workplaces and other buildings to which the public has access can avoid them by adopting the right behaviors and procedures.

Let us start with understanding fire and the substances that cause fire and explosion.

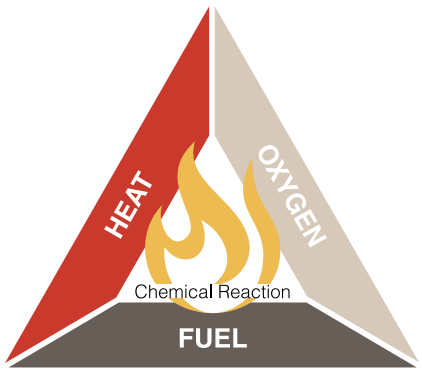
FIRE

Fire is a chemical reaction that requires three elements to be present for the reaction to take place and continue.

Four things must be present at the same time to produce fire:

- Enough oxygen to sustain combustion,
- Enough heat to raise the material to its ignition temperature,
- Some sort of fuel or combustible material, and
- The chemical, exothermic reaction is fire.

Take a look at the following diagram, called the “Fire Triangle”



Oxygen, heat, and fuel are frequently referred to as the “fire triangle”, add in the fourth element, the chemical reaction, and you have a fire “tetrahedron.” The important thing to remember is: take any one of these four things away, and you will not have a fire or the fire will be extinguished.

Essentially, fire extinguishers put out the fire by taking away one or more elements of the fire triangle/ tetrahedron.

Fire safety, at its most basic, is based upon the principle of keeping fuel sources and ignition sources separate.

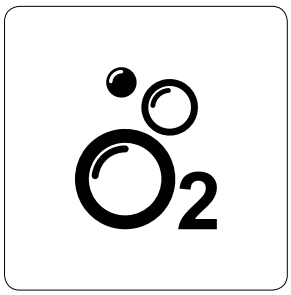
Scientists developed the concept of a fire triangle to aid in the understanding of the cause of fires and how they can be prevented and extinguished.

Heat or Ignition sources can include any material, equipment, or operation that emits a spark or flame - including obvious items, such as torches, as well as less obvious items, such as static electricity and grinding operations. Equipment or components that radiate heat, such as kettles, catalytic converters, and mufflers, also can be ignition sources.

Fuel sources include combustible materials, such as wood, paper, trash, and clothing; flammable liquids, such as gasoline or solvents; and flammable gases, such as propane or natural gas.

Oxygen in the fire triangle/tetrahedron comes from the air in the atmosphere. Air contains approximately 79 percent nitrogen and 21 percent oxygen.

A hazardous atmosphere one that is oxygen-deficient because it has less than 19.5 percent oxygen, or oxygen-enriched because it has greater than 23.5 percent oxygen. Either instance is regarded as an atmosphere immediately dangerous to life and health (IDLH) for reasons unrelated to the presence of fire. Depending on the type of fuel involved, fires can occur with a much lower volume of oxygen present than needed to support human respiration.



Every Fire incident has all three of the fire triangle elements present in it. The key to preventing fires is to keep heat and ignition sources away from materials, equipment, and structures that could act as fuel to complete the fire triangle.

TYPES AND CLASSES OF FIRE

Class K Fires

The 6 types and classes of fire and how to attack them

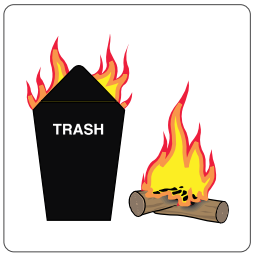
Fire is divided into six classes (A, B, C, D, E and K) that are primarily based on the fuel that is burning. This classification system helps to assess hazards and determine the most effective type of extinguishing agent used.

If a fire does start, it can spread quickly if not suppressed immediately. Knowing how to fight a fire before it grows, isn't always straightforward. Not every fire is the same. Different fires can have different hazards and risks. The source of the fire triangle (Heat, Ignition, and oxygen) can vary depending on the location, material involved, and the surrounding environment. It is important to understand that not every fire is the same, hence, treated accordingly. Using the wrong type of fire extinguisher could do more harm than good. There are different types of fire, and each should be dealt with differently.

Class A (Solids)

Class A fires are fires involving solids. These types of fires use commonly flammable material as their source. Wood, fabric, paper, plastic and cardboard are common sources of Class A fire in offices and manufacturing. It could be furniture, or fixtures and fittings, it could even be the structure of the building.

Good housekeeping should help to keep materials like packaging and reduced waste which help in minimizing risks.



The only type of fire extinguisher you should use on a class A fire is the water extinguisher. This is the most popular type of extinguisher because it can handle most fires involving solids. But, as a conductor, it should never be used near electrical equipment.

Class B (Liquids)

Class B fires are fires involving flammable liquids, petroleum, and chemical material. Many of the fluids, liquids and chemicals used in workplaces can be flammable or explosive, like cleaning fluids, solvents, fuels, inks, adhesives and paints.

Comparatively the flammable liquids accounts for a small percentage of fires, but a massive percentage of fatality. These fires are rare but more deadly than other types of fire.

Employees must be aware of the flammable liquids used in the workplace, and know that regular assessment of the Control of Substances Hazardous to Health (COSHH) leads to a reduction in the number of accidents related to hazardous substances. Also they should follow safe storage practice and use of these substances, keep them in labelled containers and away from sources of ignition.

Should a class B fire ignite, foam or powder extinguishers are the best types of extinguisher to fight this type of fire.

Class C (Gases)

Class C fires are fires involving gases. This could be natural gas, LPG or other types of gases forming a flammable or explosive atmosphere.

Work with gas is dangerous, and increases fire risk. It is recommended, keep stored gases in sealed containers in a safe storage area, and ensure that gas work is carried out by competent persons.

While extinguishers can be used on class C gas fires, the only safe method to fight this type of fire is to shut off the gas supply.

Care and control to be applied of fires involving flammable gases, where the gas source cannot be controlled, and must be carefully managed. If the flames are extinguished, and there is a chance of the gas continues to leak, an explosive atmosphere may be created, and the gas may find a source for reigniting outside of the originally affected area.

Strategies employed to manage these fires may include trying to direct or contain the fire to prevent the ignition of other fuels whilst work is done to control the fuel supply.

The best type of extinguisher to put out the gas fire is dry powder extinguisher. It can effectively break the chain reaction in a liquid or gas fire, something a water extinguisher cannot do.

Class D (Metals)

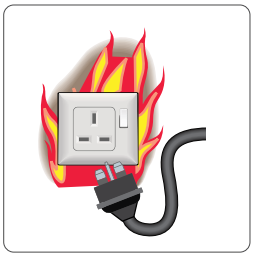
Metals are not often thought of as a combustible material, but some types of metal can be, like sodium. Metals are also good conductors, helping a fire spread. All metals will soften and melt at high temperature, which can be a big problem when metal joists and columns are present in a fire as structural elements.

Water can actually act as an accelerant on metal fires.

There are dry powder extinguishers developed to tackle metal fires. The powder inside the extinguisher may vary depending on the type of metal risk it is designed for. Small metal fires can sometimes be smothered with dry earth or sand.

Class E (Electrical Fires)

This is not strictly a class (class E) of fire, because electricity is more of a source of ignition than a fuel. However, fires in live electrical equipment are an additional hazard. You don't want to be using water, or any other conductor as that could be fatal.



Electrical fires are not given their own full class, as they can fall into any of the classifications. After all it is not the electricity burning but surrounding material that has been set alight by the electric current.

Making sure electrical equipment and installations are installed correctly, and inspected and maintained, will help to reduce the risk of this type of fire.

While you shouldn't use water to fight an electrical fire, you can use other type of fire extinguishers, like carbon dioxide, and dry powder in low voltage situations. Always turn off the power supply if you can.

Class K (Cooking Fats & Oils)

Once again, Class K fire is a cause of fire rather than ignition.

A Class K fire is defined as a cooking fire involving combustion from liquids used in food preparation. Technically a type of liquid fire, Class K fires are distinct enough to warrant their classification. Cooking fires are fueled by a wide range of liquid cooking materials. Greases, cooking oils, vegetable fat, and animal fat are all fuel sources found in Class K fires. Class K fires are naturally of concern in the foodservice and restaurant industry. Such fires can be very dangerous and far more destructive.

The only type of fire extinguisher approved for use on cooking oils and fats is the wet chemical extinguisher.

FIREFIGHTING EQUIPMENTS

Manual Firefighting Equipment

Manual firefighting equipment is mobile manual equipment (preliminary fighting) which are used for firefighting at its initial stages by regular people available in the building, including:

- Various manual fire extinguishing equipment
- Fixed firefighting equipment
- Manual water pumps
- Sand and water containers
- Special fire-resistant blankets.

Manual Fire Extinguishers:

Manual fire extinguishers are one of the most common fire suppression devices used to put out or control small fires, often in emergencies as they are not intended for use in a fire that is out of control, such as a fire that has reached the ceiling, and there is no escape route or with a lot of smoke, or the possibility of an explosion, etc., where these cases may need the expertise of professional firefighters and their tools. Also, manual fire extinguishers are simple to use and a fire extinguisher usually consists of a hand-held cylindrical pressure vessel containing an agent that can be emptied to extinguish a fire.

They are required to be present in all commercial buildings and vehicles. Fire extinguishers can be used with little to no training and are meant for small beginning stage fires. The manual extinguishers should be of a recognized type by official permit from the civil defense.

The most common extinguisher is the ABC extinguisher and is found in most offices and homes, which can be used for normal fires, liquid fires, and electrical fires. There are also special extinguishers for kitchen fires and use on burning metals.

There are different types of fire extinguishers designed to put out the different classes of fire. Selecting the appropriate fire extinguisher is an important consideration in firefighting. The wrong extinguisher actually may make a fire emergency worse. For example, failing to use a C-rated extinguisher on energized electrical components may endanger workers by causing the extinguishing material to be electrified by the energized components that are on fire. A feature of Class C fire extinguishers is that they put out a fire using a chemical that does not conduct electricity.

Types and colors of fire extinguishers and their uses

Fire extinguishers are often seen in workplaces and public buildings, situated on fire escapes and entrance doors. They are located in places where they should be visible, and easily accessible. Sometimes there will be two or more fire extinguishers together, and there's a reason for this. All fire extinguishers are red. They look fairly similar to each other, but when looked closer, one can notice, there are different colour labels on the extinguishers and even different shaped nozzles.

These different types of fire extinguishers are to be used on different classes of fire. The class of fire usually depends on what is burning. Some fires might involve cooking fats, others might involve fuels or gases, and others might be burning solids like fabrics or paper. And because all of these fires burn in different ways, they need different types of extinguishers to control and put them out.

The Fire extinguishers are labeled what type they are, and even what class of fire you can use them on.

But in an emergency, there won't be time or presence of mind to read the instruction.

So knowing the fire extinguisher types is important, so the correct extinguisher can be found quickly and avoid doing more harm than good by putting the fire off quickly. In an emergency, one shouldn't just grab any fire extinguisher and use it on any type of fire. It could put oneself and others in danger if the wrong kind of fire extinguisher is used. For example, some types of fire extinguishers could kill the user if used in a confined space (carbon dioxide), or used on an electrical fire (water).

Now we know why it is important to know about the different types and colors of fire extinguishers. Let's find out about the most common types you are likely to come across:

Water extinguishers

Water is usually the first thing you think of for putting out fires. And water fire extinguishers are probably the most common. The fire extinguisher is red with white writing and a label. It mostly works by cooling the fire to extinguish it.

The extinguishers use water as Firefighting material and they are divided into two types:

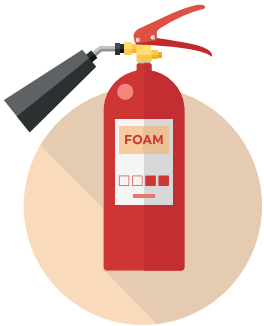
a) **Water extinguishers by gas pressure:** It is a filled cylinder with water through normal pressure. It also contains a small cylinder pressed by carbon dioxide gas and when operated the pressed gas will drive the water powerfully through the opening.

b) **Water extinguishers operating through pressure:** Two-thirds of the cylinder is filled with water and the rest with normal air or pressurized nitrogen gas, and when operated the water is driven out powerfully by the preserved pressure.

This type of fire extinguisher is simple to use. However, water fire extinguishers are only suitable for class A fires, which are fires involving solids, like burning wood, paper, plastics, etc.

Never use this type of fire extinguisher on or near electrical equipment.

Foam extinguishers



Foam fire extinguishers are red with a cream label. Foam extinguishers primarily work by smothering fires and starving the fire of the oxygen it needs to burn.

The extinguishers which provide liquid foam as fire extinguishing material and it is of two types:

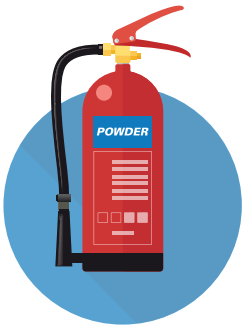
a) **Chemical Foam Extinguishers:** The type which produces the foam by chemical interaction and drives it out through the resulting pressure from the interaction.

b) **Mechanical Foam Extinguishers:** The type which produce the foam mechanically through mixing the foam materials liquid with water, air and drives them out through the pressurized carbon dioxide gas in small cylinder like water extinguishers, they can be used on class A fires. Foam extinguishers are also used on class B fires. These are fires involving liquids, like petrol and paints.

Foam extinguishers also contain water and must not be used on or near electrical equipment.

Dry Powder extinguisher:

Dry powder fire extinguishers are red with a blue label. Like foam, the non-combustible powder smothers the fire. Unlike foam extinguishers, this type of extinguisher doesn't contain water so can be used on live electrical equipment.



These are extinguishers that uses dry chemical powder as extinguishing material and they are two types based on the operation method:

- **Extinguishers operating through gas pressure:** This method drives the powder through carbon dioxide gas pressure, and is kept in a small cylinder under pressure.
- **Extinguishers operating through preserved pressure:** this method drives the powder through nitrogen gas pressure in the cylinder with the powder.

Different types of powders are used in this method based on their chemical composition, the most important type of compositions are the following:

a) The powder composition is dominated by sodium bicarbonate.
b) The powder composition is dominated by potassium bicarbonate.
c) Multipurpose powder
d) There are some types of powder allocated for certain types of metal fire and are used only for special cases.

Powder extinguishers can be used on class B (liquid), Gases, and class C (or electrical fires). They also have some limited use on class A fires. While a useful multi-purpose extinguisher, the powder does have some downsides. Powder extinguishers are very messy when used. The use of this extinguisher can fill the air with powder causing visibility issues, and inhalation of powder. And, while it can be used on electrical equipment, the powder will enter equipment and can cause damage.

Carbon Dioxide Gas Extinguishers

Carbon dioxide (CO_2) extinguishers are red with a black label. You may also notice the nozzle on this type of extinguisher is a large cone shape. The carbon dioxide in this type of extinguisher replaces the oxygen in the air surrounding the fire, preventing combustion.

The extinguishers use carbon dioxide gas as extinguishing material. They are originally one type with different sizes. The gas is kept in liquid condition by pressure and when operated the gas is driven out through the control valve on the upper part of the cylinder.

Never use this type of fire extinguisher in a confined space as it will starve you of oxygen.

Carbon dioxide extinguishers are best used for electric (C) fires. They don't contain water and won't damage surrounding equipment like powder extinguishers. They can also be used on small class B (liquid) fires, but cooling effects on the liquid are limited and the fire may re-ignite after it has been extinguished.

Don't hold the nozzle, the cooling during the discharge of gas can freeze your skin.

Training to operate the manual fire extinguishers

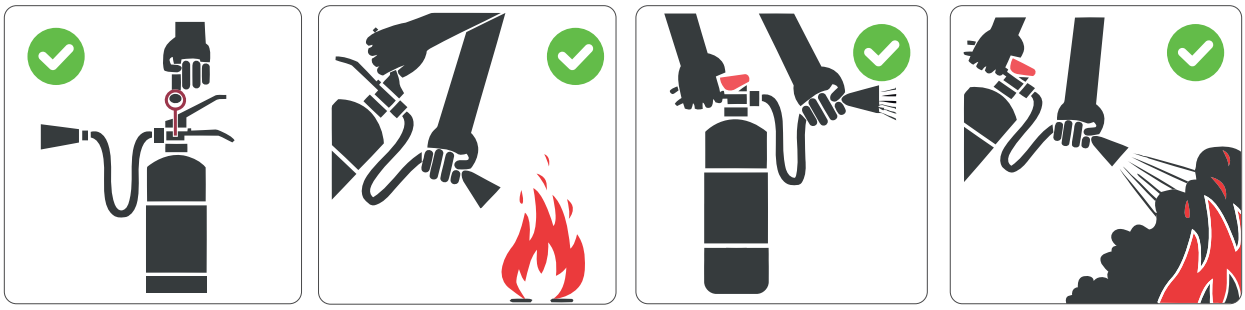
Persons who are expected to use fire extinguishers need to receive instruction and training in the selection and use of appropriate and provided equipment. A fire should only be handled if you know what to do, and it is safe to do so. Also, make sure that the fire extinguishers are checked regularly every year.

If fire extinguishers are available for employee use, it is the employer's responsibility to educate employees on the principles and practices of using a fire extinguisher and the hazards associated with fighting small or developing fires. This training must be provided annually and when a new employee is first hired.

Using a Fire Extinguisher

The following steps should be followed when responding to initial stage fire:

- Sound the fire alarm and call the fire department, if appropriate.
- Identify a safe evacuation path before approaching the fire. Do not allow the fire, heat, or smoke to come between you and your evacuation path.
- Select the appropriate type of fire extinguisher.
- Discharge the extinguisher within its effective range using the P.A.S.S. technique (pull, aim, squeeze, and sweep).
- Back away from an extinguished fire in case it flames up again.
- Evacuate immediately if the extinguisher is empty and the fire is not out.
- Evacuate immediately if the fire progresses beyond the initial stage.
- Portable fire extinguishers have two functions: to control or extinguish small or early-stage fires and to protect evacuation routes that a fire may block directly or indirectly with smoke or burning/smoldering materials.
- To extinguish a fire with a portable extinguisher, a person must have immediate access to the extinguisher, know how to actuate the unit, and know how to apply the agent effectively.
- Attempting to extinguish even a small fire carries some risk. Fires can increase in size and intensity in seconds, blocking the exit path of the firefighter and creating a hazardous atmosphere. In addition, portable fire extinguishers contain a limited amount of extinguishing agents and can be discharged in a matter of seconds. Therefore, individuals should attempt to fight only very small or incipient stage fires.
- Before fighting any fire with a portable fire extinguisher you must perform a risk assessment that evaluates the fire size, the fire fighter's evacuation path, and the atmosphere in the vicinity of the fire.
- Most fire extinguishers operate using the following P.A.S.S. technique:



Pull Aim Squeeze Sweep

1. **PULL** - Pull the pin. This will also break the tamper seal.
2. **AIM** - Aim low, pointing the extinguisher nozzle (or its horn or hose) at the base of the fire.
   NOTE: Do not touch the plastic discharge horn on CO2 extinguishers, it gets very cold and may damage the skin.
3. **SQUEEZE** - Squeeze the handle to release the extinguishing agent.
4. **SWEEP**- Sweep from side to side at the base of the fire until it appears to be out. Watch the area. If the fire re-ignites, repeat steps 2 - 4.

If you have the slightest doubt about your ability to fight a fire....EVACUATE IMMEDIATELY !

Fire Extinguishers – Maintenance

It is required that all fire extinguishers have proper maintenance programs in order to be used when needed as follow:

- In buildings, all fire extinguishers should be mounted on a wall and properly marked.
- All vehicles should carry at least one ABC-rated extinguisher.
- When at a job site, all employees should know the location of each fire extinguisher.
- Before using an extinguisher, all employees should be trained and familiar with the P.A.S.S method of firefighting.
- Each fire extinguisher should be inspected monthly to make sure it is in its designated location and has not been tampered with or actuated.
- Each fire extinguisher should be clearly visible with nothing obstructing or obscuring it from view.
- All fire extinguishers should be examined at least yearly and/or recharged or repaired to ensure operability and safety. A tag must be attached to show the maintenance or recharge date and the signature or initials of the person performing the service.

Fire Type and Suitable Extinguishers

FIRE TYPE	SUITABLE EXTINGUISHERS	COMMENTS
Fire type (A) Normal Solid Materials like papers, wood, clothes etc	**Water:** Water is distinguished with better cooling property as compared with other extinguishers. The impact of the extinguishing material on solid materials depends on the cooling property. Therefore, it is preferred to be used for fighting fire type (A). If these materials are not cooled satisfactorily they will burn again. In addition, water penetrates the fire quickly	Water is good electricity conductor and therefore should not be used for fighting electrical fires
Fire type (B) Combustible liquids and petroleum and chemical materials	**Foam:** Fires are damped by the foam which forms a cover over the burning liquid. Such cover stays after formation for some time enough to cool the liquid and stop reburying. Therefore, foam extinguisher is specially suitable for fighting liquid fires such as fuel tanks, oil heaters, linen seeds heaters and varnish boilers	It is difficult to form a cover of foam on hot liquid and it becomes impossible if the liquid is running on vertical surface. The liquids which flow on tiles or horizontal surface may extend to greater area than the capacity of the extinguisher and there are some liquids like alcohol has the power to destroy the cover formed by the extinguisher and make it ineffective. The foam is a good electricity conductor and should not be used in electrical fires
Fire type (B) Combustible liquids Such as petroleum and chemical liquids	**Dry Powder** The powder is the best extinguishers used for fighting combustible liquids fires. The powder dampen the spread of flames on the liquid surface quickly and preferred to be used instead of foam specially in the cases where the fire could extend to the neighboring materials before the foam can be formed on them. The dry powder is not a good electricity conductor and can be used with confidence.	The properties of the dry powder are limited and cannot prevent re-burning after stopping the driving of foam. Its effect also is weaker than the foam effect in case of liquid fires inside the tanks as the liquids are heated considerably due to the burning for some time or because of operations process
Fire type (B) Combustible liquids and petroleum and chemical materials	**Carbon Dioxide** Carbon dioxide dampens fire flames on the liquid surface more quicker than the form speed and it is better in fighting the fires which may spread to the surrounding materials before forming a complete foam cover. The carbon dioxide extinguisher can be used for dampening small fires which include flowing liquids on horizontal surfaces. The carbon dioxide can also be used to fight the hazard of paint and burnishing machine and the kitchens and micro laboratories tools	The carbon dioxide cooling properties are limited and do not prevent re-burning after stopping the driving. Its effect is also weaker than the foam effect, also of burning liquids inside the tanks

FIRE TYPE	SUITABLE EXTINGUISHERS	COMMENTS
Fire type (E) Electrical or Electronic equipment.	**Carbon dioxide** **Dry powder**	Carbon dioxide, dry powder: These materials are considered the best for fighting electrical fires, water, and foam extinguishers should not be used for this purpose to avoid electrical with the exception of cases where it is possible to disconnect the electrical current since water is the best Firefighting material. In case of fires which include oils or liquids it is better to use other extinguishing means. Carbon dioxide extinguishers are considered the best extinguishers for electrical fires due to their light weight
Fires type (D) Combustible Metals.	**Dry chemical powder**	**Dry chemical powder:** There is no dry powder type which is suitable for all metal fires but there is special powder for each combustible metals. Therefore it is essential to comply with the fixed instructions on the extinguishers by the manufacturers and the civil defense should be consulted on selection of suitable extinguishers for the metal fires. **Important note:** It should be noted that there is a considerable health hazard if a suitable type of extinguishers is not properly selected for metal fires fighting.

Fixed Firefighting Equipment

Fixed firefighting equipment is network extensions, out of which some are used for firefighting by normal occupants of the building and others are used by trained people such as special firefighting teams or civil defense personnel. Based on their function, they are grouped as below:

Some of the fixed firefighting equipment are simple means for firefighting at initial stages by the building occupants themselves without previous training requirements.

Fire hose reel cabinet:

rubber hose of 25mm diameter (one inch) rolled up on fixed pulley on a wall and kept inside metal box connected directly with the water supply network and ready for use immediately after pulling the hose.

Dry vertical pipes:

They are fixed water-free network extensions which include a driving point for water pumping from outside the building and pipe mains openings distributed at the required places in the building and used for assisting civil defense-men in water driving and using it for upper floors. Dry vertical pipes are required in the following type of buildings:

- Buildings consist of (5) floors and more including ground floor or buildings of (18) m height or more.
- Buildings consist of two floors if the floor area is more than 1000square meters.
- Buildings that may be in the hazardous condition as per the discretion of the civil defense.

Moisture vertical pipes:

Fixed network extensions with continuous water sources which supply water to Firefighting openings (outlet) distributed at the required locations in the building and used by civil defense personnel or by trained people for Firefighting in the building.

The moisture vertical pipes are required in the following type of buildings:

- Buildings with a height of more than 28 m.
- Buildings with a height of more than 30 m. from the ground floor level to the top floor.

Foam driving network:

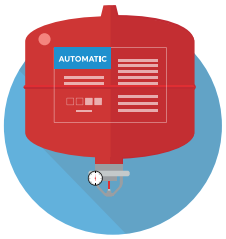
It is a fixed pipes network used for driving water mixture and the foam material to reach the outlets. The mixture of water and foam material flows in the form of bubbles and insulating the burning surface from outside oxygen whereas the water carries out the cooling process.

Fire hydrants (water mains):

Fire hydrants are underground extensions network with continuous water sources supplying fire hydrants with water and used for fighting a fire from outside by civil defensemen. Fire hydrants are required in the following cases:

- At all public roads in the cities.
- Outside the buildings provided with moisture vertical pipes network
- At the roads and courtyards of main establishments with a special hazard such as the air and seaports and major companies and assembly buildings etc. Firefighting water mains are divided into two types, vertical firefighting water mains on the ground and underground firefighting water mains.

Automatic fixed firefighting systems and equipment:



An automatic fixed firefighting system is a fixed extensions network with distributed openings at the required locations to provide a continuous source of suitable extinguishing material. It is operated automatically by sensing the heat arising from the fire or the smoke impact or by both means.

Automatic firefighting water sprayers system:

Overhead pipes network distributed to the required places to supply water with required quantity and pressure so that the water is driven through closed spray outlets (moisture sprayers). They open automatically through heat impact or the water is driven through openings covering the whole area. The automatic water sprayers network should be designed, implemented, and maintained in accordance with the specifications and requirements of civil defense specification.

Dry network Firefighting water sprayers:

Similar to the moisture network in terms of extensions but pressurized by air and water. Due to the air pressure, the valve is opened automatically and the air leaks through the spray outlet which is open by heat impact, and the water is driven out accordingly.

In advance operated moisture network: Similar to the moisture network in terms of extensions, the water is stopped by the valve and provided with assisting warning network either aerial or electrical which is operated by heat impact to open the valve and drive the water through the spray openings.

Full flood network:

Similar network to moisture network in terms of extensions but the spray heads are all opened and cover the whole area with a flood on the operation of the system.

Fitted network:

Joint system operates by combining both moisture network and dry network.

Carbon dioxide system:

It is a pipes network distributed to the required areas to be protected and provided with carbon dioxide cylinders (as extinguishing material) which are driven out on operation in the required area to be protected.

Dry chemical powder system:

It is a pipes network distributed to the required areas to be protected in containers (as extinguishing material) pressurized by nitrogen gas or carbon dioxide, on operation, which will be driven out to the required area to be protected. The materials used as an extinguisher, normally include sodium bicarbonate or mono ammonium phosphates.

Dry chemical powder systems types:

The dry chemical powder systems are divided into the following types with regard to the coverage method:

- **Full flood system:** The system which covers the size of the place or the whole room.
- **Partial flood system:** The system which covers a limited part of the building or place.

Foam and water system:

It is a pipe network distributed to the required areas to be protected, provided with foam and water either mixed or mixed before flowing on the burning surface.This mixture flows in the form of bubbles which constitute an insulating curtain to the burning surface from the oxygen whereas the water performs the cooling process

Foam Firefighting systems are divided in terms of performance method into the following types:

Fixed networks system, Generation system

The foam Firefighting systems are operated as follows:

1. **Automatic operation:** Through fire detective devices or through warning boards for operating the pumps or other means for driving the mixture
2. **Mechanical manual operation:** Through the opening of the foam valve or the mixing systems
3. **Electrical manual operation:** Through the operating the pumps or other means such as electrical devices for opening the blocking off devices
4. **Remote control system:** Through advanced programming with television cameras and computer systems

All the units should be in accordance with the international specifications recognized by the civil defense. The units should receive regular periodical maintenance service by maintenance contractors recognized by civil defense.

Fire warning systems:

Fire warning systems are divided into two main types:

1. Manual warning system is a device that operates manually through keys (calling points) distributed to certain locations and operates through electrical current. They are of two types:
   - Calling points operated manually by breaking the glazed cover.
   - Calling points are operated manually by turning the special key.
2. Automatic warning system: A device operates through electrical power for sensing fire hazards and providing a warning.

FIRE PREVENTION, FIRE PROTECTION AND FIRE FIGHTING

The three main integral components of fire safety are Fire Prevention, Fire Protection, and Firefighting. Initially, men were trained in firefighting techniques to keep the community safe, but now, as we understand the hazards more, the stress is more on educating the people on how to prevent fire. Because fire prevention is always better than firefighting. Fire prevention and fire protection are both essential to keeping lives and property safe but they are subtly different as human lives have upper priorities.

Fire Prevention

Fire prevention involves proactive steps taken to reduce fire hazards so that a fire does not have a chance to ignite. Some of the example of fire hazards includes overloaded electrical sockets, dirty fireplaces, unattended burning candles, improperly stored flammable materials, and poorly maintained heat or electric systems all of them have a big role in starting any fire, but fire prevention can reduce these hazards through regular maintenance, inspection, and training in fire protection systems. Fire prevention is essential to limit risks and reduce hazards that could potentially start fires. However, not all fires can be prevented, but the risks of human harm and material damage can be reduced.

Fire Protection

Fire protection systems are a series of mechanisms that work together to detect fires and reduce negative impacts. Fire protection includes alarms, suppression systems, sprinkler systems, fire extinguishers, and any technology that allows you to alert people when a fire is starting or monitoring it. In general, fire protection systems are put in place by professional companies by trained and licensed professionals in this field. This measure can reduce the impact of the devastating effect of the fire. But it is not to say that this is not just the installation of the system, but it is an integral part of an effective fire protection strategy, which includes regular maintenance, inspection, and continuous training.

Fire Fighting

In principle and often small fires can get out of control and spread quickly for various reasons. In this case, the only people qualified to deal with this fire are the fire brigade, so it is recommended to call the fire brigade (9999) at the beginning of the fire and not later, as procrastination and risk may lead to dire results. Firefighters are trained to put out fires to protect life, property, and the environment. Firefighters typically undergo a high degree of technical training, which includes fighting structural fires, fighting wildland and other fires. Specialized training also includes aircraft firefighting, ship firefighting, aerial firefighting, marine firefighting, close and remote firefighting such as high-rise building fires and others.

WORKPLACE FIRE SAFETY

Any organization should have a fire prevention and fire protection action plan based on the nature of the business they are in, since risks may vary depending on the function and nature of the business of the organization, it is important to consider each person's role and how vulnerable they may be. Before we look at industry wise fire safety plans, let's take a look at some basic general workplace fire safety tips.

Workplace Fire Safety Tips

The 10 fire safety tips cover the key areas to target for preventing fire or enabling a swift, safe evacuation if there is a fire.

1. **Install fire detection systems.**

   This is a legal requirement of all businesses. Some alarms may trigger automatically, but if they are manual be sure to teach employees how to operate them.

2. **Prepare an emergency plan.**

   The emergency plan instructs in detail what employees must do if they discover a fire, the types of warning systems in place, and evacuation procedures.

3. **Create fire escape routes.**

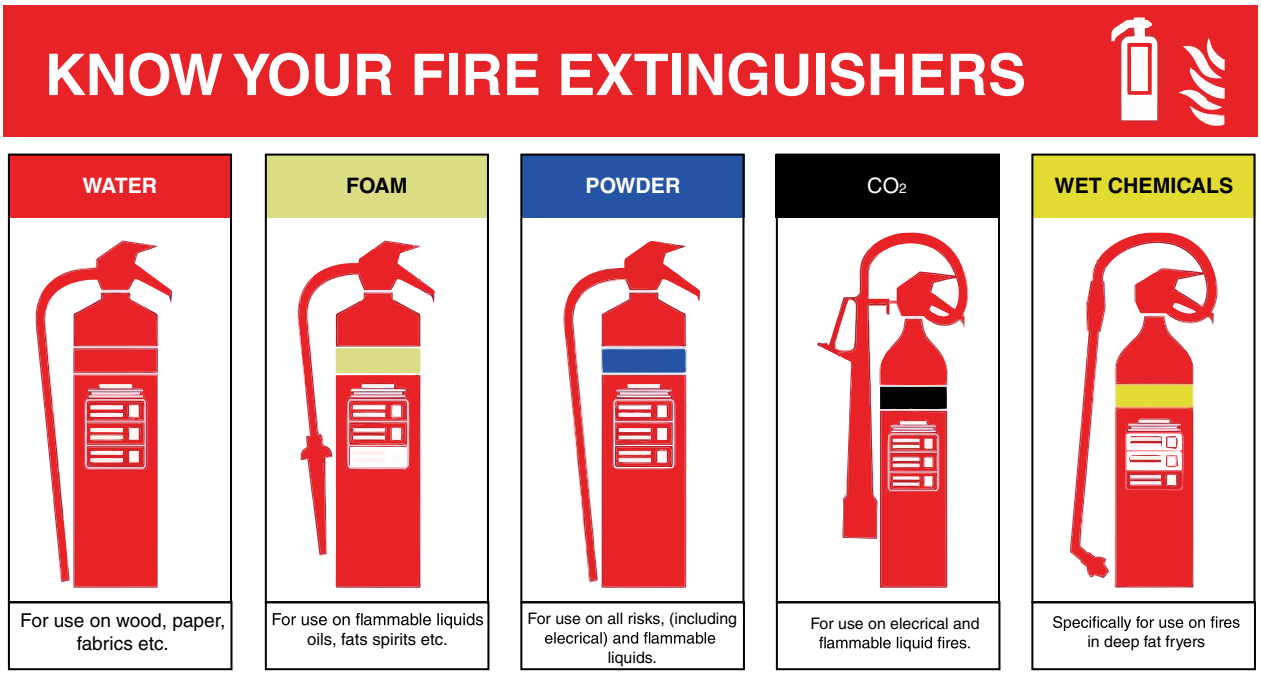
   The fire exit routes must lead people to a safe area during emergency or evacuation, also it should have clear and proper signs, and should be well lit. The fire exit routes must be planned and constructed in accordance with the civil defense rules by a qualified expert in this field to ensure they are effective.

4. **Designate a fire warden.**

   Every workplace should have one or more people in charge of monitoring fire safety and assisting with evacuations in the event of a fire. These people are known as fire wardens. They should receive training in fire safety awareness and what their role entails, as well as practical training in how to use fire-fighting equipment.

5. **Know your fire extinguishers.**

   Make sure everyone in charge of fire safety understands the different types of fire extinguishers available. The workplace should have fire extinguishers most suitable for the fire the business is at risk of, e.g. carbon dioxide extinguishers in offices. They must be distributed in appropriate places and make sure that there are extinguishers in the places designated for them according to the applicable laws (1 for every 200 square meters).


KNOW YOUR FIRE EXTINGUISHERS
WATER
For use on wood, paper, fabrics etc.
FOAM
For use on flammable liquids oils, fats spirits etc.
POWDER
For use on all risks, (including elecrical) and flammable liquids.
CO2
For use on elecrical and flammable liquid fires.
WET CHEMICALS
Specifically for use on fires in deep fat fryers

6. **Install and maintain emergency lights, exit signs, and evacuation route signs.**

   In the event of a power failure, ensure emergency egress illumination systems are in place to light aisles, exit passageways, exterior landings, and doorways. Signs should be legible, identify a starting point, mark the means of egress and show the locations of fire alarm pull stations and fire extinguishers, first aid kits, eyewash stations, and defibrillators. Be sure to test emergency lighting regularly

7. **Check fire safety signs.**

   Are they clear and suitable for those with poor vision or if the workforce is multicultural using a different language? All fire safety signs should contain pictures so anyone can understand them at a glance. Ensure they are well lit so they can be seen in an emergency, even if the power goes out.

8. **Train your employees in fire safety.**

   The training provided for the employees should explain how to raise the alarm, introduce the fire wardens, where the escape routes are, the evacuation procedures, and where the assembly point is located. Without this knowledge, fire emergencies have the potential to become even more serious.

9. **Hold regular fire drills.**

   Practice fire evacuation procedures at least annually to ensure all employees know what to do and where to go. Carry out a fire drill sooner if any major changes are made to evacuation routes.

10. **Promote good housekeeping.**

    Don't keep flammable materials, e.g. cardboard boxes, for longer than necessary. Remove and recycle them regularly. Avoid overloading plug sockets, and be sure to store electrical equipment safely to minimize deterioration.

11. **Maintain clean, organized, and safe storage areas with sufficient aisle width for a safe exit.**

    Fire exits and exit routes must be kept clear of obstructions at all times. Also, halls, corridors, aisles, and other walking paths must be wide enough to ensure that building occupants have a clean, unobstructed path to an exit (36-inch -90 cm minimum width for mercantile businesses and 28-inch-70 cm- minimum for single office/non-public work stations). It is important to note that aisles in rack storage areas provide an important fire protection role in both an emergency outlet and firefighter access. They also enable discharge sprinkling water to reach the face of stored commodities and a spatial break to reduce radiant heat.

12. **Ensure proper servicing of all fire suppression and protection equipment including automatic sprinklers, fire alarms, smoke alarms, standpipes, and smoke management systems.**

    Ensure quick and convenient access to fire protection equipment by not blocking Fire Department Connections (FDCs) and other equipment with temporary storage containers, removable shelving or racks, trash, and debris, or other obstructions. For restaurants, grease accumulation in the commercial hood and duct exhaust systems adds to the fire danger. Periodic inspection and cleaning will reduce the likelihood of catastrophic fire.

13. **Install code-compliant locks on all Exit doors.**

    Ensure delayed egress locks release automatically upon power outages or operation of your fire sprinklers. Install proper panic hardware, emergency lighting, and a highly visible sign adjacent to the hardware that says, “PUSH UNTIL ALARM SOUNDS.”

Identify People at Risk

Make fire evacuation plans

Don’t forget to make a re evacuation plan

People in and around the premises

In the event of a fire, the management should consider where all staff and visitors to the site are likely to be, and ensure that they have a clear and safe route out of the building.

This may depend on several localized factors, as well as the nature of these individuals, their knowledge of protocols, and their ability to leave the premises swiftly and safely.

People at elevated risk

Special consideration should be made to individuals or groups who may have a heightened risk in the event of a fire. These may include:

- Vulnerable people (e.g. those with disabilities)
- Isolated people (e.g. maintenance staff or similar)
- Lone workers (e.g. cleaning staff)
- People with language difficulties, or for whom English/ Arabic is not the first language
- Children and young people
- People who are not familiar with your fire action plan

Review your fire safety protocols

Fire safety protocols should consist of the following critical steps:

Evaluate the risk of fire

Fires are most commonly started by accident (e.g. dropping or forgetting to extinguish something), by negligence (e.g. poor maintenance and cleaning, or arson. A combination of employee training, incident reporting, and aggressive identification of risk factors will help to reduce the risks posed by these three scenarios.

Evaluate the outcomes of fire

Regardless of how well you have prepared, there is always some chance of a fire occurring at the workplace, may it be office, warehouse, or factory. Consideration should be taken, in the event of fire what will happen and how this could put people at risk. It's important to identify these risks well in advance and make every effort to mitigate them through the use of training and structural modifications.

Take action to reduce risks

Once risks are identified and the impact they will have, the action plan should be made based on this assessment and aim to:

- Remove sources of ignition, fuel, and oxygen
- Control the density of people and goods
- Alter layouts to make evacuation easier
- Implement early detection and warning systems
- Facilitate firefighting and access for firefighters
- Use marked, lit, and maintained fire escapes
- Use emergency lighting and clear signage
- Ensure proper maintenance of equipment and factory/warehouse floor

Record, plan, inform

Health and safety management systems in any workplace must pay close attention to effective management. But it will be impossible without proper documentation of fire risk assessment and reporting of risks, hazards, and accidents of all kinds, as it becomes impossible to learn from mistakes and improve through frequent change without that, and therefore every important result must be documented in the assessment, taking the necessary actions to address it this will help ensure compliance and adjust future policies.

By identifying how a fire is likely to spread, the profile of the workforce and visitors, and which risks cannot be completely eliminated, a better, informed emergency plan of action can be drafted.

Training is also a crucial element of this workforce preparedness. There are several officially recognized fire safety modules are available and can be offered to general employees as well as managers and fire safety wardens. The company should encourage a safety culture where safety is treated seriously, and the lines of communication are clear. This will enhance teamwork and cooperation, as much as preparation, which is vital for a successful fire safety policy.

OFFICES

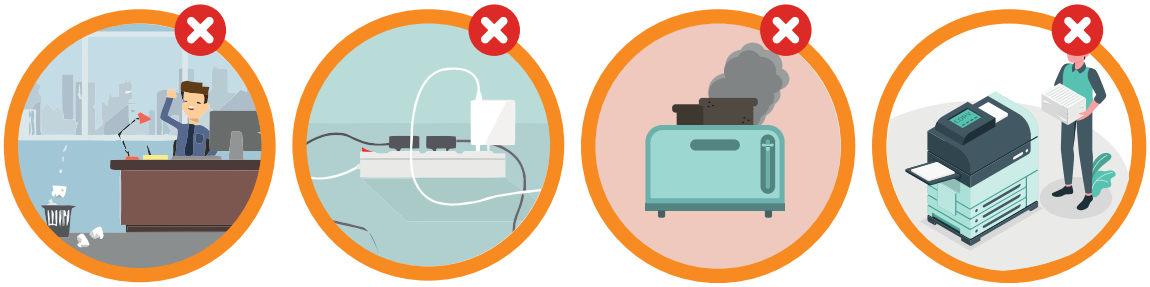
An office is a room, set of rooms, or building used as a place for commercial, professional, or bureaucratic work. The number of employees, the content of the office, and what is stored in the office may vary depending on the line of business each office is involved in, However, it might surprise that many office fires have similar causes as many types of fires in different areas. Knowing that the common fire risks can help to prevent the occurrence of fires. So, here are the top hazards to be aware of in office buildings that can be dealt with:

Electrical equipment such as photocopiers, not being maintained properly or Portable appliance tested (PAT) not tested. Electrical faults are a major cause of fire in offices.

- Paper, cards, and other flammable materials being stored inappropriately, e.g. under desks, or next to electrical equipment
- Accidents occurring in common pantries caused by electrical equipment, such as a toaster, being left unattended whilst in use.
- Taller buildings are more hazardous to escape from in the event of a fire and so special care must be taken to protect escape routes.

The working environment must comply with all building regulations, to ensure the safety of the employees and the protection of the building.

Although the employer or business owner is usually the main person responsible for ensuring that their workplace is fire safe, all employees should be knowledgeable about how they can help prevent a fire in their working environment.



How to prevent a workplace fire:

Care of the Building Inside

- Housekeeping should be a priority in all workspaces. Keeping combustible material to a minimum is essential to prevent accidental ignition.
- Decorations and displays should be of fire-resistive materials and be placed only in common/public areas of the building (break rooms, lounges, reception areas, etc.)
- Never place any objects in the exit path or block access to exit doors.
- Coffee makers should always be placed on a non-combustible surface and should incorporate an auto-shutoff timer device.
- Cooking equipment such as hotplates and toaster ovens, or any device that utilizes hot elements should not be used in the workplace unless in a specifically designated area.
- Materials stored on shelves or cabinets must be at least 18 inches (45 cm) below any fire sprinkler.
- Never block access to emergency equipment such as fire extinguishers, fire alarms, or eyewashes.
- Readily combustible materials such as paper, cardboard, or packing should not be allowed to accumulate and should be removed from the building as often as necessary to avoid being a fire hazard.
- Smoking is not allowed inside the building.
- Posters, banners, or other combustible items cannot exceed 20% of any wall area within a room.

Electrical Safety

Extension Cords

- Never use extension cords instead of permanent wiring. Extension cords are only to be used for temporary service and are to be unplugged at the end of each day.
- Never run cords through doorways, over or under partitions, above ceiling panels, or through walls.
- Never place objects over cords, such as rugs or mats.
- Do not “daisy-chain” cords together to extend their length. Cords are required to be plugged directly into a wall receptacle.
- Do not attempt to make or use “homemade” extension cords.

Multi-plug devices

- Do not use multi-plug devices on receptacles.
- The use of fuse-protected power strips with multiple outlets is approved for use where multiple items require power.
- Do not connect the power strips.

Electrical Panels

- Electrical panels require sufficient space around them to allow maintenance and emergency access. Never place items in front of electrical panels.
  A minimum of 3 feet (90 cm) is required in front of, and next to panels. Consult the authorized electrical contractor.
- Electrical panels should be secured (locked) at all times.

Ground fault interrupting circuits

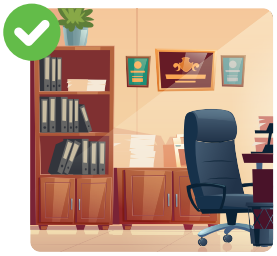
- Any electrical outlet within six feet of a water source (sinks, water fountains, showers, etc.) must be a Ground fault interrupting circuit (GFCI).
- All outlets on the exterior of buildings must be GFCI
- Extension cords used outside or in the vicinity of any surface that is potentially damp must incorporate a GFCI device.

Electrical appliances

- All electrical devices should be inspected routinely for worn cords or damaged plugs. Any device with damaged cords/plugs should be removed from service until the cords can be repaired/replaced. Do not attempt to make repairs on electrical appliances - contact the authorized dealers for repair or replacement.

Storage

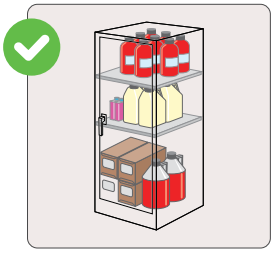
General Storage



All storage rooms must be maintained in an orderly manner. Stored combustible materials should be kept to a minimum. This means the following good housekeeping practices must be employed:

- Loose storage (paper, books, or files) must be kept off floors and either put into boxes or stacked in an organized manner on shelves.
- Aisles, at least 29" (73.66 CM) wide, must be maintained to access storage and must be clear and free of tripping hazards at all times. These aisles will also act as a route of escape in an emergency.
- Storage may not be stacked within 18" (45.72 CM) of a sprinkler head in areas that are protected by an automatic sprinkler system. In areas not protected by sprinklers, storage must be at least 24 inches (60.96 CM) from the ceiling.
- Stored materials must be kept at least 36 inches (91.44 CM) from any heat source.
- Storage cannot block fire extinguishers, fire alarm pull stations, emergency or exit lighting, access to evacuation routes or the exit door, emergency equipment or prevent the entry of emergency personnel.
- Storage under stairs is not permitted unless the area is enclosed and protected with a one-hour fire-rated enclosure and detection and/or suppression system.
- Smoking is not permitted in any storage area under any conditions.
- Storage of any kind is prohibited in corridors, stairwells, or the access areas to exits

Flammable Liquids



Flammable liquids, gases, or hazardous materials are not to be stored with combustible items storage containing paper, wood, plastics, cardboard, etc. Flammable liquids are required to be stored in specific, designated spaces

Attics/Basements

- Storage in unfinished attics, crawl spaces, or other areas where exposed, unprotected structural areas is prohibited.
- Only approved and designated spaces should be allowed for storage.

Corridors and Exits

General Part

Corridors, stairwells, and exit doors are intended to accommodate large numbers of people who may need to exit the building quickly and safely. Therefore, nothing should be placed in corridors or stairwells that might become an obstruction or cause a delay in exiting.

- No storage of any kind is allowed in corridors or stairwells.
- Waste materials, recycling materials or surplus equipment, or furniture awaiting pickup or disposal should not be placed in corridors, no matter how temporary.

Minimum way-out widths

- All work areas must have a clear path to exit doors a minimum of 36 inches in width.
- Corridors, hallways, and exit paths to stairwells or exterior doors must be maintained at their full width to accommodate the expected occupant load.
- In no case shall the exit width of corridors be less than 44 inches.

Fire Doors

- Fire Doors must remain closed at all times unless equipped with automatic controls.
- Never prop open fire doors, or place any objects in such a way as to interfere with their operation.
- All fire doors must close and latch in place.
- Never lock or block access to fire doors and stairwells.

Exits and Signage

- All exits must be identified with illuminated signs
- Never cover or block Exit signs – signs must be visible at all times
- Exit signs are required in every room, corridor, or other occupied space when the number of persons could be 50 or more.

Open Flame / Ignition sources

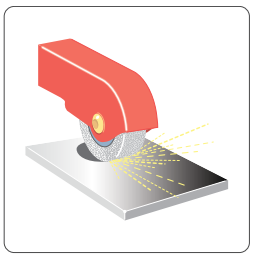
- Candles and other open flame devices are prohibited in all working spaces,
- No burners, incense, or other burning or smoldering items are allowed in any structure without prior approval/permit, from the concerned parties.

FIRE SAFETY AT FACTORIES AND WORKSHOPS

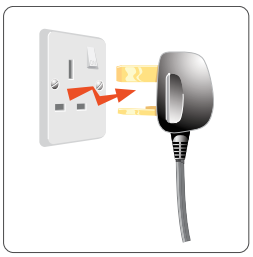
Factories and warehouses are prone to several risks, but fire can be one of the most devastating. Factory fires can occur from unforeseen problems, such as human error or faulty equipment. The level of danger of factory fires can increase or decrease due to; the nature of work being done on the premises, the number of employees in the factory, and the time of day the work is carried out, the size of the site, variety of materials and presence of clutter. Possibility of any one of these factors or a combination of more than one factor means that fire safety has to be attended to with extreme vigilance, including regular risk assessments.

Here is the process behind a factory and warehouse fire risk assessment, and important points to look out during the site safety checks which include:

Naked flames



Sparks



Faulty electrics

Extractor fans

Identify Fire Hazards

Every facility is different, and on the surface appears certain ignition and fuel sources may be eliminated as nonfactors, this should be done only with utmost careful investigation and absolute certainty. However, any fire hazard inspection in a factory or workshop should include all areas and every fire hazard which should be identified and considered, including stored objects, machinery, and structural elements which may aid the spreading of the fire.

Sources of Ignition

The most common ignition sources for factories and warehouses include:

- Cigarettes, matches, and lighters – these can be carelessly discarded by employees, and often result from an absence of properly designated smoking areas and cigarette bins
- Naked flames – these may be part of the manufacturing process
- Sparks – these may be a by-product of manufacturing processes, and can easily ignite dust and other collected debris

- Hot work – machinery and vehicles can produce heat that may ignite combustible materials, as can machinery and equipment brought into the factory or warehouse environment. These machines often have ventilation which must be maintained and not blocked in any way
- Extractor fans – equipment designed to extract dust can become hot or clogged up, posing a fire risk in itself
- Conventional heat sources – Heating, Ventilation, and Air Conditioning (HVAC) and radiators are a predictable risk, but traditional advice applies – do not cover heat sources, block ventilation, or place at risk objects in their vicinity
- Frictional heat and static – moving objects and machinery can easily generate heat and static, which can cause debris and other neighboring objects to catch. This is a particular risk in factory and distribution environments with conveyor belts
- Faulty electrics – poorly fitted and designed cables and other electrical devices can be prone to breakage and heat generation
- Faulty equipment – poorly maintained machinery and equipment can be prone to electrical fires and the accumulation of debris
- Lighting – some light sources can also produce sufficient heat to start fires, particularly if they are left on for long periods. Halogen lamps are of particular concern, although these may be less likely to be used in a factory or warehouse environment. However, the tight confines of some warehouses and the need to illuminate items can mean that lighting is a potential risk factor
- Arson – Arson by definition is the willful and malicious setting fire to, or causing to be burned, or aiding, counseling, or procuring the burning of, a dwelling house, or building adjoining or adjacent to a dwelling house, or a building by the burning whereof a dwelling house is burned, whether such dwelling house or other. Arson is a rare but constant threat, and efforts should be made to prevent it. Combustible materials should not be left in easily accessible locations, such as a Trash container at the side of a building, and security measures should be used to deter intruders, including lighting, security fences, and cameras if necessary

Sources of Fuel

Fuel sources commonly found in factory and warehouse environments include:

- Flammable liquids and solvents – Petrol, methylated spirit, white spirit, disposable lighters, and e-cigarettes/vape pens are the most common sources, but other risk factors include paints, oils, varnishes, thinners, and adhesives
- Flammable chemicals – cleaning products used to remove dust and debris can often be an equal or greater fire risk, and precautions should be taken to ensure that they do not come into contact with any live ignition sources
- Waste products – debris including wood shavings, dust, shredded paper, and other litter can easily accumulate if proper cleaning routines are not put in place
- Flammable gases – gases including Liquefied Petroleum Gas (LPG) and refrigerants are common in areas where products and equipment are refrigerated and transported, making their storage and handling an active fire risk
- Stored goods – high-density pallet racking and other methods of warehouse storage can be a substantial fire risk, depending on the storage container, the contents of the racking, its placement, and how closely the products are packed
- Foodstuffs – certain foodstuffs are either flammable or prone to spontaneous combustion. These include products with high oil content, butter, sugar, cinnamon, flour, and pistachios
- Paper and packaging – cardboard boxes, packing materials, labels, and other stationery all present a fire risk and are prone to be blown around or discarded
- Combustible insulation - risk areas should be assessed for these materials.

Sources of Oxygen

The air around us is the primary source of oxygen for a fire, with some extinguishers working by suppressing the oxygen supply in space. However, additional sources of oxygen may include:

- Oxidizing chemicals – identified by their Control of Substances Hazardous to Health Regulations (COSHH) hazard logo
- Oxygen cylinders, e.g. for welding
- Pyrotechnics

Examples of frequent fire hazard problems, and how to counteract:

Machinery substances

Factory machinery may contain flammable substances. The chances of catching fire are due to unauthorized fixing of machinery by workers, operator error, or lack of regular maintenance of the machinery.

This can be prevented with strict procedures and training for employees to help minimize factory fires, which can prevent a potential fire break-out.

Storerooms

Overloaded storerooms are one of the important areas to pay attention to. In most cases, flammable products stored in the factory are often stored in cupboards or storerooms. These storage rooms should be regularly checked, maintained, and organized, which can decrease the potential risk of a small fire that eventually changes to a large fire within or in the radius factory.

This situation can be countered by installing smoke or heat detectors from fires in these warehouses, as in the case of a fire that can be contained within a smaller area and controlled before the situation escalates. Additionally, rigorous procedures and training for plant personnel can increase their ability to deal with the situation, which can reduce risks and protect everyone from fires in these areas.

Pantry/kitchen

Equipment provided for tea rooms and kitchens in the factory can affect the fire risk level. Primarily unattended cookery equipment, kitchens, and dining facilities are high fire hazard risks. The risk can be minimized with specified training for workers in the factory in handling the kitchen equipment and having the correct fire suppression can allow workers to eliminate the danger.

Training

The employees working in the plant must also have the proper training for safety and fire protection. It is beneficial to have the appropriate fire protection equipment for each area. However, during emergencies, the possibility exists that they will not be effective without employees knowing what to do. Therefore, this can exacerbate the problem and cannot be contained easily, and soon it becomes an unnecessary fire danger in the fire area. Therefore, the level of training must be raised to include fire procedures to stop fires and how to interact with appropriate precautions for all types of fire from simple to severe in degrees.

Fire assessments

A regular fire risk assessment is mandatory for factories. This assessment can point out specific areas of fire safety and protection for the factory, whilst ensuring the appropriate systems are fixed in the right areas.

Fire hazards in a warehouse or manufacturing facility can be severe. Not only can various equipment or machinery pose a significant fire hazard if not properly maintained, but extensive fire damage can also be devastating to business resulting in loss of life, property, and time. To keep both personnel and merchandise protected from fires, warehouses and manufacturers must always take fire safety seriously, and make it a priority to ensure that these facilities are adequately prepared for any potential fire at any given time.

When it comes to preventing and containing fires, there are many things that officials at manufacturing facilities and warehouses can do to ensure that they have the proper safety precautions in place in the event of a fire.

Important fire safety tips for warehouse and warehouse owners:

Development of an evacuation plan for employees and anyone using the building.

In the event of a facility fire, the priority is to ensure that staff and visitors can exit the building quickly and safely. Fire can cause severe stress and fear in people, which in turn can lead to negative reactions such as fear and panic that must be dealt with. Warehouses and manufacturers can counter this outcome by developing an appropriate evacuation plan that directs all employees to the nearest location in a calm and controlled manner. Furthermore, asking employees to review the evacuation plan regularly or to rehearse the evacuation in a fire drill can help employees feel prepared in the event of a fire and provide them with the tools to respond appropriately in an emergency.

Install an appropriate and certified fire protection system

Commercial fire protection equipment often acts as the first line of defense against a fire in a warehouse or a manufacturing plant. Everything from a simple, hand-held fire extinguisher to a complex fire sprinkler or suppression system can help contain a fire or extinguish a flame before it spreads out of control. Fire protection equipment is vital because it works to counter fire in the critical time between when the fire starts and when emergency response team arrive. They can also help hold off a fire long enough to ensure that employees can safely exit the building. It is important to know which types of fire protection equipment can best protect each property based on their work and the people working on site.

Mandatory fire safety training

Setting aside a dedicated time for training to educate employees about fire safety is also essential when it comes to fire safety in a warehouse or manufacturing facility. Safety training should touch on topics including the location of fire extinguishers and other equipment, identification of all exits, instructions on how to use fire protection devices, discussion of evacuation routes, general knowledge about how fires can start or spread, and fire safety tips specific to the work done on-site. Training will equip employees with the knowledge necessary to respond to a fire and remain calm in an emergency for their safety.

Keep facilities and workspaces clean

When a workspace is cluttered with work materials, papers, or even garbage, there is an increased risk that those materials can feed to open flame. This is especially the case when those objects are highly combustible or can easily catch on fire. All workstations should be kept tidy, but it is especially important to clean areas around welding stations or other workspaces that generate sparks or flames. Providing plenty of wastebaskets or recycling cans can help employees stay on top of garbage disposal in the facility. And remember to keep the appropriate type of fire extinguisher handy should a spark ignite the items around you.

Require employees to wear protective clothing

Another fire safety tip that is often overlooked is requiring employees to wear protective clothing whenever they work with machinery that creates sparks or excessive heat. Sometimes employees fail to wear protective equipment because they believe the job will be quick or because they have completed thousands of similar jobs without accidents. However, these are not good enough excuses to forego protective clothing when one rogue spark could easily ignite an individual's clothing or burn uncovered skin. It's better to be safe than sorry and enforce strict rules requiring employees to wear protective clothing for all activities involving heat or sparks. Therefore, personal protective equipment must always be optimal and make a difference in protecting individuals during a fire.

Follow CDAA fire codes

This may seem logical, but civil defense and ambulance codes are designed to protect facilities from fire hazards, as they are codes to activate an emergency response. As a result, following the regulations set

by the Civil Defense and Ambulance will inherently improve the overall fire safety of the facility. Compliance with regulations is not only an excellent way to enhance fire safety in a warehouse or manufacturing facility but also ensures that you will not receive fines for non-compliance with laws and regulations.

Work with a fire safety specialist

If there are questions about the effectiveness of fire safety in an organization's warehouse or manufacturing facilities, or if there is a question as to whether there is anything else that can be done to improve fire preparedness, the role of the fire safety specialist is an excellent resource for the required knowledge and assistance. Because a safety specialist has a great deal of knowledge and experience in the fire field and the field of fire safety and prevention, his awareness will check for deficiencies in the facility that perhaps no one would have considered. Working with a fire safety professional can help you feel confident and ready to respond to a fire at any time.

FIRE PROTECTION FOR OIL AND GAS WORKSITES

The oil and gas industry plays a major role in the world's economic and political system. As one of the most important sources of income for the oil-producing countries in the world, especially the Gulf Cooperation Council countries, oil and gas is a major industry in Oman. This is an important sector in any economy as it caters to a wide range of industries including petrochemicals, fertilizers, automobiles, etc., but the oil and gas industry is one of the most critical when it comes to employee health and safety. This is due to the nature of operations, where there are many opportunities for the risks of flash fires associated with drilling oil and gas wells, servicing, refining, and operations related to production in the stages of manufacturing various materials related to oil and gas. It is no secret that oil exploration is a very dangerous undertaking. Also, the oil and gas industry is complex, as many things can go wrong during repeated operations, which sometimes involve strict deadlines in terms of completing any operation. The most important of these risks that this industry is exposed to is the possibility of fires and explosions, which leads to loss of life, destruction of property, disruption, and delay in operations.

With the flammable chemicals, gases, and materials used in the oil and gas industry, employers are paying great attention to fire protection in the workplace. Controlling fire hazards is a key part of ensuring worker safety on extraction, refining, and other sites.

Fire Prevention in the Oil and Gas Industry

- **Preventing fires with a Hot-Works Program**

  Welding, cutting, brazing, and grinding create a significant risk of fires and explosions. This type of work generates hot sparks and slag. Those can then come into contact with nearby combustibles and flammable gases. Here are some basic ways you can prevent hot-work incidents:

- **Having and using a hot-work permit**

  A written permit is required in certain situations. But, it's a good idea to use them for all your hot-work activities anyway. The permit ensures that all necessary safety precautions are in place. It also helps lower the risk of fire or explosion.

- **Performing hot-work in a safe location**

  Remove all combustibles from the area before conducting hot work. Whenever possible, perform the work in an area that won't interfere with other workers.

- **Wearing the proper Personal Protective Equipment (PPE)**

  Always wear Fire Resistance (FR) clothing when performing hot work. It is the responsibility of the employer to provide this to the employee. Further, FR clothing should be maintained and kept in good condition.

- **Using fire blankets to protect nearby equipment from sparks and slag**

  If you cannot move combustibles or nearby equipment out of the way, lay fire blankets over them. This will protect them and prevent them from catching fire.

- **Having fire extinguishers nearby and ready to use**

  Employees should always know where to find the nearest fire extinguisher. This is even more critical when performing hot work. Hoses and other suppression equipment can work too.

- **Assigning a fire watch for all hot-work activities**

  A fire watch should always be present for hot-work activities. The fire watch should know how to sound the alarm in the event of a fire. They should also know to only extinguish a fire when it is small and contained to one area.

Preventing fires by understanding ignition sources

What's another common cause of fires and explosions in the oil and gas industry? The ignition of flammable vapors from mobile engines and auxiliary motors.

Vehicles and motorized equipment present ignition hazards when located near flammable vapor sources. This is why it's important to conduct fire risk assessments. This also creates the need to safely position all motorized equipment during drilling, servicing, and production operations.

Some of the ignition sources you'll find on-site in the oil fields are:

- Internal-combustion engine sparks
- Open flames from any source
- Cigarettes, or smoking
- Welding operations
- Electric power tools
- Two-way radios
- Vehicles with catalytic converters
- Portable generators

To protect the employees from ignition source hazards, a lot of rules and management practices should be put in place. In addition, the employees should be trained to recognize the hazards, also, engineering control and monitoring equipment should be considered. Fire Risk Assessments are a great way to ensure that safe work practices are being followed. They will help in assessing if the risk of fire has been minimized.

The Fire Risk Assessment will include identifying potential sources of flammable vapors, these sources include wellbores, tanks, trucks, pumps, and more. Once the source is identified, it should be made sure that these vapors are at a safe distance from any ignition sources. Also, a safe area, boundaries, and entry routes for all vehicles and motorized equipment should be established.

Other safe work practices to be followed include:

- Provide spark arrestors for internal-combustion engines
- Prohibit vehicles with catalytic converters from the immediate vicinity of the rig
- Prohibit open flames from the vicinity of the rig

Training Your Employees

Train your employees to recognize hazards specific to the oil and gas industry. For instance, they should know what it means when an engine "over revs" or starts "running away." When this happens, the engine is in a gas cloud and at high risk for a catastrophic explosion. If this occurs, employees need to immediately evacuate the area.

Employees should also be aware of the content and hazards of the equipment they are working on. The oil industry uses very complex equipment that young or new employees may not be familiar with. Take the time to train them properly before letting them loose.

More Ways to Prevent Fires in Oil and Gas

Here are some more ways that you can better protect your employees:

- **Perform Routine Audits and Inspections**

  Routine audits and inspections are a good way to verify if the company is prepared for fire and incidents. Inspect the areas that are at high risk for fire and explosion. Determine a path forward if found that there's room for improvement.

- **Provide and Maintain Fire Suppression Equipment**

  Make sure that there is enough fire suppression equipment on hand and they are well maintained by doing regular inspections. Immediately replace any equipment that has damage or defects.

- **Train Employees on Safe Work Procedures**

  Employees should be trained on the topics of fire and explosion safety on a regular basis, including how to use fire extinguishers and other equipment. Each employee should understand what's required when performing hot-work. Their knowledge on the different ignition sources that they may face in the oil field should be checked.

- **Use an Emergency Alert System**

  Develop an emergency action plan that explains what to do in the event of a fire or explosion. Employees need to know of an emergency immediately so they can respond appropriately. Alarms, radios, and mobile devices are all great options.

- **Perform an Occasional Fire Drill**

  The best way to determine if everybody is prepared for an emergency is to run a drill. This will help employees prepare for a real-life situation. And it will indicate where are the improvement is required.

Handling Flammable and Combustible Liquids

- During refueling operations, all engines and motors will be turned off and allowed to cool.
- Open flames or other ignition sources must be kept at least 50 feet (1.5 meters) away from flammable or combustible liquids.
- No smoking is permitted during the fueling process.
- Containers being filled with fuel will be placed directly on the ground or a grounding strap attached to form a ground connection.
- No flammable liquid or gas will be used unless it has been positively identified beforehand.
- Health and physical hazards will be communicated to employees before the product is used.
- When flammable liquids and gases are being transported, all concerned agencies and the civil defense rules will be followed.

Liquefied Petroleum Gas

Because LPG is a compressed gas, fairly large quantities can be stored in relatively small containers. As a point of reference, LPG expands at a ratio of 270-to-1. This means that one liquid drop of LPG would expand to a gas state 270 times greater in volume.

LPG collects in low-lying areas because its vapor density is heavier than air. Employees should be warned that if they suspect a leak in a cylinder, they must not use fire to attempt to find the hole. Instead, they are to use soapy water and look for bubbles.

Employees should not attempt to extinguish fires involving LPG. If an LPG fire breaks out, employees should evacuate the area immediately and call the fire department. Fighting an LPG fire requires specialized training that only the fire department can provide. Employee attempts to extinguish the fire could create larger hazards.

Handling Flammable Gases

- LPG cylinders will be placed on a firm foundation and secured in an upright position.
- All LPG cylinders will be equipped with valve-protection devices.
- LPG cylinders will not be stored closer than 10 feet (3 meters) to the kettle.
- LPG cylinders will be placed away from vehicular traffic.
- LPG cylinders will not be stored inside buildings.
- Acetylene bottles will be stored in the upright position and secured.
- When in transport or not in use, acetylene bottles will have caps in place.
- Oxygen cylinders must be stored at least 20 feet (6.096 m) from acetylene cylinders.

FIRE SAFETY IN COMMERCIAL BUILDINGS

Public Places – Malls, Exhibitions and Theater

Commercial buildings must abide by a set of fire safety regulations stipulated by CDAA. These regulations are set in place to protect the safety of residents, customers, the general public, and of course any fire officers. When picking a commercial fire alarm system or setting up a commercial fire safety equipment installation, it's important to keep the regulations in mind.

Installation and Maintenance of a Commercial Fire Alarm System

CDAA has set regulations regarding the function of commercial fire alarm systems. Failure to meet these standards not only puts your property and the lives of your employees or tenants in jeopardy, but could also result in a costly citation or fine. Some CDAA regulations relating to your commercial fire alarm system include:

- Alarm must be loud enough to be heard over ambient noise
- Alarm must be recognized as an alarm or emergency signal
- Procedures must be in place for sounding alarms
- Alarm must trigger an emergency response or action

To avoid violation when installing a commercial fire alarm system, make sure your commercial fire alarm system is constructed and installed properly, the commercial fire alarm system is in working order after a test, and lastly, you must make sure spare fire alarm devices are available.

Proper Street and Complex Directions

In order for fire services to arrive at a commercial property, addresses must be clearly visible from the street. If buildings are within a complex, the building numbers should be easy to identify with labels facing the street or signs with directions to the numbered buildings. Weather should be taken into account when signs are posted and visibility is considered.

Easy Access for Firefighters

Once firefighters arrive at a commercial building, they must perform a variety of tasks that require a certain level of physical access to the building. Obstructions and barriers can usually be overcome by fire services, but this takes up valuable time that could be used to protect people and property. Stakeholders must be aware of service access points to the building and whether or not a key or code is required to enter.

Maintain Proper Signage throughout the Building

Firefighters cannot do their job if they do not have access to the equipment they need or cannot find their way to the emergency. This is why commercial buildings must have proper signage inside the building as well as outside. Floors and rooms should be clearly mapped. Access to certain doors and areas like roofs should be labeled. Fire safety equipment and hazardous materials need to be identified.

Installation and Maintenance of Sprinkler Systems

Sprinkler systems play an essential role in helping to put out newly erupting fires in a commercial building. A properly installed and functioning fire sprinkler system can save time, money, and lives. CDAA regulates various commercial fire safety equipment installations like sprinkler systems for this reason.

CDAA requires that sprinkler systems are inspected and tested annually. No items should be covering or blocking the sprinkler system and that there is no debris or material on the sprinkler system (this includes paint. Do not paint over a sprinkler head). Sprinkler systems must be checked for corrosion or mineral build-up.

Large commercial complex buildings such as shopping malls pose many challenges for architects and their design teams. This is because most malls are multifunctional assembly buildings that provide visitors with a mix of retail outlets, dining, and other recreational activities such as children's play, rides, and multiplex cinemas, which in turn can make building layouts more complex, so they are constantly changing to suit maximizing of revenue, which poses a challenge to the fire and safety systems.

Keeping the customer's safe

The constant influx of mall users and their safety issues has become an additional factor for these types of buildings. It is important to understand and recognize the risks of shopping complexes and the interaction between different building users. This can help develop the optimal fire protection strategy for the building, reducing the possibility of a fire occurring in the first place. Also, by working closely with all stakeholders involved in the project Including the client (or representative), design team, police and security personnel, civil defense, security professionals, etc. from this standpoint, a fire engineer can ensure that fire safety objectives are included for all parties involved in the design and that protection systems are recommended from the appropriate fire according to the civil defense strategy, the most important of which is to save lives at any time and reduce properties damage.

PROTECTING CINEMAS & PLACES OF PUBLIC ASSEMBLY

Worldwide, there are many examples of fires in public assembly buildings that have resulted in the tragic loss of life. Despite the severity of these incidents, lessons learned from past events led to the creation and updating of emergency codes to address these types of fatal fire accidents in such places. Therefore, the potential for loss of life in a public gathering fire is directly related to the number of people under threat at the time of the incident.

Safety concerns

Cinemas, often multi-screen venues, are commonly found in large, crowded, buildings of multiple-use such as malls or leisure centers, conference and exhibition centres, more recently in an airport complex. A large number of people present represents a significant potential for loss of life in the event of a fire. It, therefore, requires the highest standards of design and management to ensure that risks are anticipated and covered by the best possible systems for life safety and property protection. Assuming the original design is well-coordinated, and the fire strategy is robust, the one key factor that needs to be present, if a disaster is to be averted, is a high standard of fire safety management.

The only common element in multi-fatal fires is the failure of those in the building to take the correct action when a fire is detected, or an alarm is sounded. Effective management, along with adequate and appropriate training provided to all, can ensure that employees are likely to take the correct measures to help members of the public leave the building safely. Since existing routes are likely to be familiar with only the basic entry routes and may have limited knowledge of space planning, alternate exits must be properly positioned in case of any emergency, and that staff assistance is available to guide people to exits.

Many shopping malls and airports in the region not only provide a complete shopping and leisure experience but also provide direct interfaces to hotels, apartments, and transportation infrastructure. The evacuation strategy for the whole building must consider all potential users, including those who are awake and familiar with the building, and those likely to be asleep and unfamiliar with the building layout.

Construction and design

The construction and design of a building should intrinsically consider the life safety of occupants, but often it does not. For example, nightclubs and restaurants might be located on the top floors of high-rise buildings. This location can delay firefighters from arriving and attacking a fire promptly. If delayed, they cannot assist in initial rescue or evacuation efforts.

A public assembly building might consist of large, unbroken areas that allow a fire/smoke to spread quickly. On the other hand, a maze-like configuration can confuse people who are disoriented by smoke and trying to locate the route through which they entered the building.

Firefighters might find that building access/egress is limited because of building renovations, which can include false fronts and windowless design. Some buildings have been converted from other occupancies to leisure, including cinemas, and firefighters who are unaware of this change in building occupancy could be confronted with a serious life hazard problem if they are unaware of the change of use.

A person unfamiliar with a building is likely not to react according to a defined evacuation plan unless directed to do so by a person in charge of the building. So under emergency conditions, this guidance may not be given much weight, or the person may not understand the message. This causes people to react in a way that they think will better protect themselves, which can cause evacuation problems for firefighters and harm everyone.

A building's heating, ventilation, and air-conditioning (HVAC) system can spread fire and smoke. Knowledge and control of these systems by the fire department might assist firefighting operations if it is deemed beneficial to utilize these systems to ventilate smoke from the building. If this is not possible, these systems should be shut down immediately to prevent the spread of fire and smoke.

Furnishings and finishes

Although an official can diligently inspect a building during construction for code compliance, furnishings that are added afterward can contribute to a fast-burning fire. A management concern is an aesthetic effect that is created by furnishings; rarely is the attention paid to the fire resistance of a material that is selected for their premises. The recent development of premium cinema experiences may have an impact on the variety of furnishings that could increase the fire load in such venues.

Decorative combustible furnishings will let the fire spread at such a rate that the occupants might have little time to escape.

Occupancy

The number, and placement, of exit doors in cinemas and public assembly buildings, is based on the number of people that can be expected to occupy a building. However, public assembly buildings have the potential for overcrowding; this can be a common occurrence in popular nightclubs during special events, also, the number of multi-screen cinemas offering multiple viewing choices to customers brings the challenge of catering for a variety of age groups and families groups, etc. all having the potential to react differently in an evacuation scenario. During an emergency evacuation, and where overcrowding exists, exit doors can become congested with people, restricting egress. The inability to leave a building when confronted with a fire or smoky conditions can lead to an uncoordinated evacuation. It has the consequences of not being able to that may lead to uncoordinated evacuation and many disasters such as deaths and other damages

Exits

Cinemas in places of assembly might have only a single entrance that is familiar to patrons, which hinders a rapid and orderly exit. An adequate number of properly marked and unobstructed exits is extremely important for a robust fire strategy. Locked exits not only cut down the number of exits that are available but also can cause deadly delays. A fleeing occupant who finds a locked exit door needs to locate another exit. A firefighter might be endangered by relying on an exit as a secondary means of egress, only to find the door locked

Evacuation

Some public assembly buildings are easier to evacuate than others. Human behavior can play a key factor in the success of an evacuation and building management teams should understand the likely behavior of different building user groups.

Strategic considerations

Overcrowding will compound evacuation problems. There might be many occupants who are unfamiliar with the building hurrying to escape but in the wrong direction. Lighting might be dimmed for an aesthetic effect. Smoke might further cut visibility. It isn't always possible to determine whether everyone has been evacuated or whether some individuals are still trapped within a building.

Familiarisation with suppression systems lets firefighters know what building protective systems can assist them. When arriving on the scene of a sprinkled building, they need to be prepared to support the sprinklers to ensure an adequate flow of water; stretch hose lines to these systems and pressurize them if the system has been activated.

A decision must be made on whether firefighters should be committed to fight the fire or assist in the evacuation. A direct attack to control the fire often is the best method for saving lives. Coordination is needed to ensure that firefighting efforts don't endanger occupants who are trapped or evacuating the building. Immediate ventilation can often be a viable strategy for saving lives. The removal of smoke and gases, although initially accelerating the fire, might permit an effective evacuation and fire attack.

Long hose lines stretches and made untidy must be anticipated, and those that are stretched for long distances must not interfere with people who are evacuating. as Hose lines can't be stretched into the building via doorways that are being utilized for evacuation; as they would cause confusion and hazards for the escaping occupants. So Firefighters must use another location or wait until the evacuation is completed, if possible.

Identifying problems

The major method to deal with public assembly fires is thorough preplanning, code enactment, and code enforcement. During these processes, potential problems can be found and resolved. Hiring experienced fire engineers as early as possible during the planning stages of a project is a good way to ensure this isn't missed.

The management team of a cinema complex should develop robust emergency response plans which are rehearsed by all staff members. An ongoing process of fire risk assessment should highlight any issues that require immediate attention to reduce the risk of fire occurring. An active maintenance schedule should be in place for the installed fire safety systems with regular fire drills carried out to ensure the evacuation plans are strong in the unlikely event they need to be implemented.

FIRE SAFETY AT SCHOOL AND COLLEGES

Fires can cause devastating effects to any type of premises. However, schools, in particular, are at significant risk. They are often filled with numerous fire hazards and potentially hundreds of students, many of which may be vulnerable or don't fully understand what to do during a fire. This can make evacuation procedures difficult.

Therefore, schools must establish a clear, step-by-step evacuation plan that explains exactly what everyone should do in the event of a fire. Furthermore, you must carry out regular fire drills. Doing so is not only important for checking that the plan works in practice, but also for familiarizing everyone in the school – students in particular – with the evacuation process

Schools and colleges must ensure that fire precautions at the schools and colleges comply with all relevant health and safety regulations.

The safety of all children, visitors, and staff at the premises is paramount. The Principal and nominated staff will ensure procedures are in place for the safe evacuation of children, visitors, and staff, including those who may be disabled, from the school.

Note: the safe evacuation of the school is not the responsibility of the fire service.

Determining the responsibilities of employees and health and safety personnel as well as training and providing information by the school, college, or university, where it is unreasonable for the manager and responsible people such as the facilities manager and safety personnel to notify all employees of the necessary action when a fire is detected, (new employees will receive training as part of the initialization process), the following to be observed:

Raising the alarm;

- Action to be taken on hearing the alarm
- The exit routes available to staff at various points in the building
- The practical use and location of portable fire-fighting equipment
- The assembly points around the building and roll-call procedures
- The procedure for re-entry to the building

Good housekeeping practices refresher training will be given to staff once every year unless there are changes in the use or layout of the building. In such cases, staff will need to be re-trained to include the new arrangements before those arrangements come into force.

Note: All staff will effectively act as 'Fire Marshals' during an evacuation.

Protective Equipment - Fire Extinguishers' firefighting equipment should be provided throughout the building and is marked with the appropriate signage. Only persons who have received training in the use of extinguishers should attempt to use them. However, extinguishers should only be used by the trained staff if the fire is minor and can be tackled without putting those staff at risk.

Inspection Procedures/Good Housekeeping practices, Regular inspections of fire safety equipment, exit routes, etc. should be carried out in accordance with the details in the Health and Safety / Fire Precautions logbook, which should be kept in the Facilities Managers office.

The Facilities Manager responsible for health and safety in the school should conduct a fire risk assessment and review annually. An evacuation exercise should take place at least once a term and as soon as possible after any new intake of students is admitted to the school. A record must be kept of the results of these tests and which members of staff attended them. The Health and Safety Officer or a delegated responsible should undertake a weekly visual inspection of all firefighting equipment to ensure that they are in the correct location and have not been tampered with. Extinguishers are fitted with a tag that will drop below the level of the trigger grip if they have been tampered with.

Daily visual checks should be carried out by the Facilities management team or a nominated person as follows: –

- On the physical state of fire extinguishers.
- Checking that the exit routes are free from obstruction and are left unlocked.
- Reporting all defects to the Principal or other nominated persons who will ensure that any remedial action is taken.

Regular annual checks of all fire extinguishers will be undertaken by the equipment supplier. Every occupied room will have a fire action notice. A Fire Evacuation Plan depicted by an outline drawing of the building will also be displayed on all floors at exit points.

The following sequence of actions should take place when a fire is detected.

1. Alarm
2. Evacuation of premises
3. Call the fire brigade (to ensure that they have been called automatically)
4. Report to the assembly point
5. Tackle the fire (if it is safe to do so)
6. Duties and Identities of employees with specific responsibilities
7. Kitchen Staff/ Caretaker/Cleaning Staff - make sure no one left behind.

Procedures for liaison with the fire brigade

- **Alarm** - ANYONE discovering a fire should without hesitation activate the nearest fire alarm break glass call point. Children should be taught to report to a member of staff. The alarm is tested weekly by the facilities manager or a designated representative who will activate a different call point each week and log any faults, reporting any defects to the Principal.
- **Evacuation of premises** - On hearing the alarm students should stand behind their chairs and when instructed by the teacher in charge, exit the building following the route indicated on the fire drill procedure. Bags and coats are NOT to be collected on the way out.

  The teacher/member of staff will ensure that all doors are closed behind them as they leave the premises. The teaching staff is to make sure toilets are checked before vacating the premises and moving directly to the assembly point. The evacuation should take place in a quiet and orderly manner so that instructions can be heard.
- Calling the fire brigade - All outbreaks of fire are to be reported to the fire brigade. It is the duty of the Principal (if absent – the facilities manager) to make the call before vacating the premises and to meet the fire services on their arrival.

- **Report to assembly point** - At the assembly point classes should line up in year group order. The academy attendance officer will take the registers to the assembly point and distribute them to the person responsible for the tutor group. The school administrator should check the visitors present against the visitor's register and check the support staff register.
- **Call the roll** - The member of staff in charge of the form group should call the register and show that 'all are present' by raising the register in the air.
- **Tackling the fire** - The overriding duty of the staff is to ensure the safety of the children and themselves. Small fires may be tackled (after sounding the alarm) by staff using the method appropriate to the type of fire if it would be safe to do so. Staff should be instructed in the use of portable extinguishers if they are to fight a small fire.
- **Duties and Identities of employees with specific responsibilities** - Principal/facilities manager – on hearing the alarm will contact the fire brigade using the 9999 telephone system.
- **Academy Administrators** - On hearing the alarm they should collect all class registers and the visitor's book and take them to the assembly point. Principal – at the assembly point should liaise with the class teachers /teaching assistants/administrators/fire marshals to confirm that a roll call has taken place and establish if any persons are missing. The principal and key staff should establish two-way communication with those staff responsible for escorting disabled students/staff or visitors to refuge areas on the first and second floor before their evacuation from the building.
- **Kitchen Staff/ Caretaker/Cleaning Staff will**: Immediately cease all activities switch off all appliances, evacuate the premises and proceed to the assembly point.
- **Procedures for liaison with the fire brigade** - The principal or facilities manager should meet the fire brigade on the driveway of the school on their arrival, and give them details of any persons missing; staff and disabled students/staff/visitors in refuge areas; the location of the fire (if known) and access points into the building. Evacuation of disabled persons - student, staff, or visitor. The Principal will ensure plans have been made so that any disabled person(s) experiencing difficulty in evacuating the building are properly escorted, initially to the safe area (refuge) and then to the assembly point. Identified staff should remain with disabled persons until they can be safely evacuated from the building, or return to the classroom once the fire officer has determined it is safe to do so.

This article explains why fire drills are so important in schools and looks at what they entail. It will enable you to carry out useful fire drills that help you refine your evacuation plan and ensure everyone in the school is prepared for an emergency.

The Importance of Fire Drills in Schools

Everyone in a school needs to take part in regular fire drills, as it helps them to fully grasp the building's escape routes and the instruction they must follow. In particular, fire drills help young students and those still maturing to become accustomed to the process and recognize that they need to take fire safety seriously. This can help to reduce confusion, panic, and any disorderly behavior.

It also helps familiarize teachers and other responsible people with their role during an emergency. All school staff has to help students evacuate the school during a fire, so they need to know what steps to take. If they can practice remaining calm and organized during a fire, they'll be ready to ensure everyone's safety when it counts.

Carrying out a fire drill is crucial, as it helps to:

- Remind staff and students of the sound and/or sight of fire alarms, the location of emergency routes, the assembly point, and any specific fire safety procedures.
- Test that fire safety measures work as intended.

- Assess how quickly people can evacuate from the school.
- Identify areas where alarms or signs may not be clear to people.
- Allow fire wardens to practice their duties.
- Test personal emergency evacuation plans.
- Ensure that emergency routes and exits are free from obstructions.
- Test your school's roll calling procedure.

All schools and colleges are required by law to have preventative measures and evacuation procedures in place. Furthermore, they must provide everyone with information, instruction, and training relating to fire safety. Fire drills are an important part of fulfilling this requirement, as it's unrealistic to expect people to know what to do without practice.

FIRE SAFETY AT RESIDENTIAL BUILDING

Fire Safety Awareness

There are general fire safety precautions that should be followed regardless of where you live. Taking time to review tips about fire safety issues can help to create a safer and more secure living environment for every family, friend, and visitor in any residential area.

Most fires start within apartment blocks, within individual apartments themselves and then spread to all apartment blocks. As the main cause, most of the time is electrical faults from overloaded sockets, also from the results of the remains of lit cigarettes thrown in the wrong place, as it may constitute another major problem causing a fire. Most fires can start when they are not extinguished properly, or when someone smokes and throws a cigarette out of a window away and falls through a neighbor's open window below on combustible materials. It should be mentioned that open flame sources of cooking and frying pans are especially dangerous when someone forgets to turn off the stove. As well as leaving scented candles, incense and agarwood when left unattended.

The best protection from fire is prevention. The building managing agent has a duty to take steps to prevent fires from breaking out in the communal areas, but, each tenant should ensure that their home is as safe as possible. Smoke detectors are the most effective way of preventing fires. They also give vital early warning and extra time to escape in the event of one breaking out. It's important to check the doors in the flats are in good condition and that they shut properly. Never remove internal doors or wedge them open; make sure they're closed at night. Everyone in the household should know where the keys are kept for the main door.

The landlord or managing agent has a legal duty to arrange for a fire risk assessment to be carried out on the communal areas of the building, and for it to be kept under review. But there are a few things that every tenant should follow:

- Don't obstruct the communal areas, which often form the fire escape route for the block
- Don't prop open fire doors in communal areas
- Don't clutter the stairs, corridors, and landings with personal items or things that can set fire easily

- Don't store prams, bicycles, or mobility scooters in communal areas without the permission of the landlord or managing agent. You won't get permission if the fire safety of the block is put at risk
- If you see anything in the communal areas that don't belong there, remove it or tell your landlord or managing agent
- Don't store flammable materials in cupboards that have electrical circuits, make sure you put all rubbish in the bins provided — don't leave it lying around in the refuse area as this can easily be set on fire

Escape Plans

Because fire is a risk in every building, whether people sleep, study, and live, there should always be an escape plan. People must escape within a few minutes of a fire's start, the safe exit depends on an immediate warning from smoke alarms and advances planning of escape routes.

Escape Plan Basics

The following basics escape plans should be followed:

- Include two ways out of every room in all escape plans
- There should be a designated location to meet outside the building
- The smoke alarms should be installed and verified regularly to provide early detection and warning so there is enough time to execute the escape plan
- Make sure doors located in the escape path of travel can be opened from the inside under all lighting conditions
- Verify that doors located in your path of travel Do not require a key to open from the inside
- Take note of whether any disabled or elderly residents will require evacuation assistance
- Conduct a roll call to verify everyone has escaped the building
- Remain outside until notified by the fire department that it is safe to re-enter the building

If your secondary escape route is a window…

- Make sure the window can be opened from the inside
- Assure the window is large enough for you to pass through the opening
- Verify the windowsill is low enough to allow you to crawl through the opening
- Make sure any security bars can be opened from the inside without the use of a key, and that you can open them under all lighting conditions
- Determine how you will escape if the window is above the first floor: will you have a rope or a ladder or other emergency escape device, or will you wait for the fire department to arrive and evacuate you?
- Make sure sloping terrain, the location of the window, or other factors will not prevent the window from being used as a secondary escape route.

Smoke Alarms

If the fire starts when the household is sleeping, valuable time is wasted. For this reason, providing smoke alarms in bedrooms may be the single most important step toward preventing fire-related casualties in residential buildings.

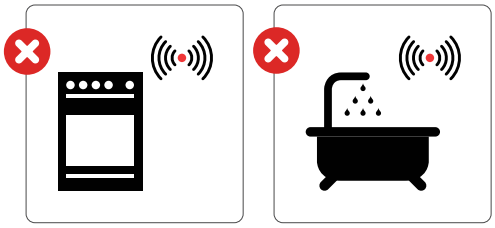
Smoke Alarm Basics

- Install at least one smoke or heat alarm in every bedroom
- Install additional smoke alarms in hallways and common areas in the vicinity of bedrooms
- Install at least one smoke alarm on every level of your home
- Make sure the smoke alarms within your home are interconnected so the activation of one alarm will activate all alarms within the home

- Try to use smoke alarms powered by the building electrical system, which has a battery for backup power, however, if this type of smoke alarm is not available, battery-powered units are certainly better than not having smoke alarms at all.

Smoke or Heat Alarm Installation

The following steps are recommended in installing fire alarm detectors:



- Install smoke alarms on ceilings whenever possible
- Locate any smoke alarms installed on walls at least four inches below the ceiling
- Locate any smoke alarms installed on walls no more than 12 inches below the ceiling
- **Do not** install smoke alarms in the corners of rooms
- **Do not** install smoke alarms next to air-conditioning vents, heating vents, or ceiling fans, to ensure the proper functioning of the unit
- **Do not** install smoke alarms in kitchens or bathrooms, to prevent false alarms

Smoke or Heat Alarm Maintenance

The following steps are recommended for maintaining the fire alarms:

- Test smoke alarms at least once a month, by pressing the button on the alarm that allows you to test the unit
- Smoke alarms with non-replaceable 10-year batteries are designed to remain effective for up to 10 years. If the alarm chirps, warning that the battery is low, replace the entire smoke alarm right away
- Smoke alarms with any other type of battery need a new battery at least once a year. If the alarm chirps, warning the battery is low, replace the battery right away
- Replace smoke alarms every 10 years

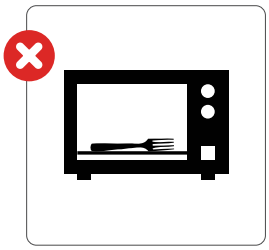
Candles and Incense

Candles and incense are often used to create ambiance or help celebrate a special event, but they are open flames that pose a threat of fire. Most candle fires take place in the bedroom, and many occur when candles are left unattended. In addition, the winter holidays and New Year's Eve are peak times for candle fires, so be sure to exercise caution when celebrating with open flames.

The candle and incense basic precausions recommended to be taken:

- Remember: candles and burning incense are open flames, and the safest option is not to have them in your home
- Never leave candles or incense unattended, and always extinguish them before leaving the room or going to sleep
- Keep candles and incense away from curtains, clothing, books and newspapers, and other combustible items
- Keep candles and incense away from flammable liquids (i.e., alcohol, oil, etc.)
- Use durable candle holders, which are made of non-combustible materials, are big enough to collect wax drippings, and don't tip over easily
- Trim candlewicks to one-quarter inch, and maintain this wick length throughout the candle's life
- Extinguish taper and pillar candles when their wax melts down to within two inches of the holder, and extinguish encased candles before the last half-inch of wax starts to melt
- Use flashlights during blackouts instead of candles, and always avoid carrying lit candles whenever possible

Cooking



Cooking fires are the leading cause of home fires and household fire injuries. Unattended cooking is the leading cause of these fires, most of which start with the ignition of common household items including grease, paper, cabinets, and curtains.

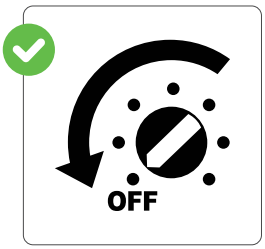
Here we have some cooking safety basics from causing fire:

- Never leave food unattended while it's cooking on the stove, and closely monitor food cooking in the oven
- Maintain a clean and tidy cooking area that is free of items that catch on fire easily, such as cloth (curtains, potholders, towels, etc.), paper (cookbooks, food packaging, newspapers, etc.), and plastic (food packaging, storage containers, etc.)
- Roll up your shirtsleeves, or wear short, tight sleeves while cooking, so your clothes don't accidentally hang onto stove burners and catch fire
- Always keep a potholder, oven mitt, and lid on hand
- Never use a wet potholder or oven mitt, to avoid scalding when the moisture in the cloth heats up
- Never plug microwaves into extension cords, and never microwave metal containers or tinfoil
- Keep children and pets away from cooking areas

In the event of stovetop fire, the following steps should be addressed:

- If the fire is small and contained in a pan, put on an oven mitt and smother the flames by carefully sliding the lid over the pan
- Turn off the burner if you can
- Don't remove the lid until it is completely cool
- Never pour water on a grease fire
- Never discharge a fire extinguisher onto a pan fire since it can splatter burning grease out of the pan and spread the fire

In the Event of Oven Fire:



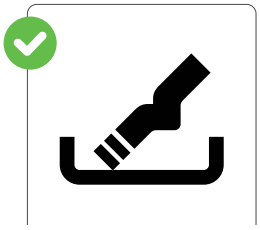
- Turn off the heat
- Keep the oven door closed to prevent you and your clothes from catching fire
- Notify other occupants, and evacuate the building
- Call the fire department

In the Event of Microwave Fire:

- Keep the microwave door closed
- Unplug the microwave to remove the source of heat
- Notify other occupants, and evacuate the building
- Call the fire department

Smoking

The respiratory health hazards of smoking are well-publicised, but a lesser-known fact is that smoking materials are the leading cause of fire-related deaths. The most commonly ignited items in these fatal fires are mattresses and bedding, upholstered furniture, and floor coverings.



Smoking Fire Safety

- Smoke outside, so you Do not put others at risk
- Never smoke in bed

- Never smoke in an area where oxygen tanks are being used
- Don't smoke if you are sleepy, have been drinking, or have taken medicine or other drugs that impair your ability to handle smoking materials correctly
- Use deep, wide ashtrays on a sturdy surface
- Make sure butts and ashes are extinguished by soaking them in water before discarding them
- Check under furniture cushions, and in other places, people smoke, for butts and ashes that may have fallen out of sight
- Keep matches and lighters out of children's sight and reach
- Consider using fire-safe cigarettes, which are less likely to cause fires

Vaping and Electronic Cigarette

Even though statistically there is less of a chance of a fire than a traditional fire there is still to learn more about fires and explosions caused by different smoking materials

Electricity

Electrical distribution equipment poses serious fire safety threats that can even be fatal, especially when equipment is used incorrectly.

Electrical Safety Basics

- Protect electrical outlets with plastic safety covers if small children are present at home
- Never operate electrical appliances around bathtubs, showers, or puddles of standing water
- Use ground fault circuit interrupter (GFCI) protection when working where water is near electricity, to protect against electric shock … This means you should use GFCIs in your kitchen, laundry room, bathroom, and outdoor locations
- Replace or repair frayed, loose, or otherwise damaged cords on all electronics
- Shut off the circuit and have it checked by an electrician if any switches feel warm

- Take note of any discolored switch plates, because discoloration could indicate that the electrical wiring behind the switch plate is overheating
- Remember: symptoms of potential wiring problems include household lights that dim or flicker, a TV picture that shrinks in size, frequent blown fuses, or circuit breakers that trip frequently
- Place lamps on level surfaces, away from flammable items, and use light bulbs that match the lamps' recommended wattages
- USB - Multi charging stations are not allowed and should generally be avoided. These units are prone to overheating and a multitude of these devices have been recalled by the Consumer Product Safety Commission over safety concerns in many countries due to causing fires.

Extension Cords and Surge Suppressers

- Never use an extension cord as a replacement for permanent wiring
- Avoid running extension cords across doorways or under carpets
- Make sure power strips and surge suppressors are designed to handle the loads that are used for
- Connect power strips and surge protectors directly into a wall outlet. Do not connect multiple power strips or surge protectors together
- Avoid overloading circuits by plugging too many items into the same outlet
- Avoid the use of "cube taps" and other devices that allow the connection of multiple appliances into a single receptacle, and try to only plug one high-wattage item into each outlet

Halogen Lighting

- Avoid using halogen lamps whenever possible since they operate at much higher temperatures than normal light bulbs
- If you use halogen lamps, make sure the lamp is placed in a location where it cannot come into contact with drapes, clothing, or other combustible materials
- Keep halogen lamps and cords away from high-traffic areas and turn lamps off when leaving the room for an extended period

Air Conditioning & Fire Safety

Any air conditioner that doesn't have regular maintenance carried out, runs the risk of developing a fault that could lead to a fire. This can be caused by several things such as worn-out filters, fault fire dampers, or a buildup of debris.

Some other common causes of AC fires are faulty equipment, flammable materials that are stored close by, and malfunctioning controls. When a system doesn't undergo maintenance, it can lead to internal system damage that could lead to a fire.

Common causes of air conditioner fires:

Flammable Materials

Storing any type of flammable material near your unit or system can put your system at risk of catching fire. Allowing materials such as paper, leaves, other debris, or flammable liquids near your air conditioner means there is a potential fire risk. All units and systems should be kept clear and free of any materials or debris, and the recommended distance is 3 meters.

Poor Cleaning/Maintenance

Failure to have regular maintenance or cleaning carried out, is one of the most common air conditioning fire causes. Many people think air conditioning will look after itself, which can lead to problems occurring. All parts of the units or system need to be thoroughly cleaned, including the air vents, filters, and coils. Any obstruction to how the system works means your system or unit is at risk of catching fire.

Fault Parts & Equipment

When you neglect an air conditioning system, you won't know if all of the parts and equipment are working how they should be. Systems and units that are left unmaintained will gradually degrade until it faults occurs or it stops functioning altogether. System failure can lead to a large amount of heat building up, which can lead to a fire breaking out. Having your air conditioning serviced regularly by a professional will help to keep your system running smoothly all year round.

How to Prevent Air Conditioning Fires?

Whether you're a home or business owner, there are several things that you can do to help prevent air conditioning fires. Taking a proactive approach to preventing AC fires will help to protect both your property and the people in it. Below we'll go through some of the best ways to prevent air conditions fires.

Regular Maintenance

Having regular air conditioning maintenance carried out will help to ensure the system or unit is kept clean and fully functioning. Any servicing should be carried out by trained professionals to ensure it is carried out correctly.

Fire Dampers

Fire dampers are passive fire protection that is used in heating, cooling, and ventilation units and systems. As when places inside air conditioning ducts they can help to prevent fires from spreading. So the dampers are designed to trigger when the temperature in the duct reaches a particular level, the increased temperature will melt the fuse in the fire

damper, which will trigger the door leading to air flow to shut. This method cuts the flow of air which helps to prevent the spread of fire through the vents.

Fire Sprinklers

One of the most common ways to protect any property from fire is with a fire sprinkler system. Sprinklers can be installed throughout a property, meaning they provide comprehensive fire protection coverage across the whole of your property.

Laundry

Laundry equipment is often overlooked when addressing the issue of home fire safety. However, laundry appliances pose a serious fire risk because they involve electricity, and the combination of combustible clothing and extremely hot temperatures. The vast majority of laundry fires are caused by dryers that are not cleaned properly.

Dryer Safety Basics

- Have dryers installed and serviced by a competent professional
- Make sure that the dryer is plugged into an outlet that meets its electrical needs, so it doesn't overload the outlet and trip circuit breakers or blow fuses
- Keep the area around the dryer clear of boxes, clothing, and other combustibles
- Turn the dryer off when leaving home

Lint Filters

- Do not operate the dryer without a lint filter
- Clean lint filters before or after each use, and remove any lint from around the dryer drum
- Make sure the dryer exhausts into the exterior or a listed water trap
- Inspect the area around the dryer for accumulations of lint, paying special attention to the area behind the dryer, and remove any lint
- Inspect the flexible exhaust duct (if your dryer has one), and remove lint accumulations periodically

Gasoline

Each year gasoline causes several thousand household fires, many of which result in injury and even death. It is helpful to remember gasoline is a volatile liquid that is constantly releasing flammable vapors, which are heavier than air and accumulate at the lowest point in an area. If released inside a building, these vapors sink to floor level and spread out across the room, and if these vapors make contact with an ignition source a flash-fire will likely result.

Gasoline Safety Basics

- Keep gasoline out of children's reach and sight, and never allow children to handle gas
- Never use gasoline inside the home or as a cleaning agent
- Never use gasoline to wash mechanical parts
- Never use gasoline to start a fire in barbecue pits or cooking grills
- Never use gasoline as a replacement for kerosene or diesel
- Do not use or store gasoline near potential ignition sources, including gas-fired water heaters that contain a pilot flame
- Follow all manufacturers' instructions when using electronics (including all devices with batteries or connections to electrical outlets) near gasoline
- Clean up spills immediately and discard clean-up materials properly

In the Event of Gasoline Fire

- Leave the area immediately, and call the fire department
- Do not attempt to extinguish the fire
- Do not attempt to stop the flow of gasoline

Gasoline Storage

- Store gasoline outside in a garage or shed
- Never store gasoline in glass, or plastic milk jugs and other non-reusable plastic containers
- Store gasoline in a tightly closed metal or plastic container designed, manufactured, and approved specifically for gasoline storage
- Store only the amount of gasoline necessary to power equipment and machinery

Fueling and Handling Gasoline

- Do not smoke while handling gasoline
- Use caution when fueling machinery and automobile equipment
- Never fuel machinery or equipment indoors, and always let it cool before refueling
- Place portable gasoline containers on the ground before filling, and only fill them outdoors
- Never fill portable containers inside a vehicle or in the bed of a pick-up truck, to prevent a static charge from developing
- Do not get in and out of automobiles while fueling, although rare, this movement creates an electrical charge on your body that could spark a fire, especially during dry weather conditions

Propane

Many home fires are caused by liquid propane annually, and these fires cause hundreds of injuries and deaths. Propane is a flammable gas that is converted to a liquid before being stored within a cylinder or tank. When released from its container, propane converts back to a gas and expands significantly; if this expanding gas comes in contact with an ignition source an explosion can result. When first released, the gas is cold and heavier than the surrounding air, which creates a “cloud” of heavy gas that will stay close to the ground and collect in low areas.

Propane Safety Basics

- Never store or use propane gas cylinders larger than one pound inside your home
- Never store or operate a propane-powered gas grill indoors
- Always handle propane-powered equipment cautiously, according to the manufacturers’ instructions
- Have propane gas equipment inspected by a professional for leaks and faulty parts regularly
- Follow the manufacturers’ instructions carefully when lighting pilots
- Leave the area immediately and call the fire department from outside the home if you smell a strong odor of gas

FIRE SAFETY AND EVACUATION AT HOSPITALS

Hospitals are the most complex of building types. Each hospital is comprised of a wide range of services and functional units. These include diagnostic and treatment functions, such as clinical laboratories, imaging, emergency rooms, and surgery; hospitality functions, such as food service and housekeeping; and the fundamental inpatient care or bed-related function. This diversity is reflected in the breadth and specificity of regulations, codes, and oversight that govern hospital construction and operations. Each of the wide-ranging and constantly evolving functions of a hospital, including highly complicated mechanical, electrical, and telecommunications systems, requires specialized knowledge and expertise. The hospital, as an infrastructure, has much heat-dissipating equipment, combustible gasses /fuel, chemicals, a lot of electrical wiring, etc. that are prone to hazardous incidents, if proper precautions are not taken while planning the infrastructure. Adequate measures need to be considered, designed, and practiced to ensure safety for all. Indicators like architectural designs, interior designs, electrical wiring, and appropriate equipment planning, and proper waste management are considered while planning such safety measures

While planning the layout, care should be taken to design the building such that there is sufficient open space around the building to minimize fire spread possibilities from or to neighboring structures. Also, there should be enough space for movement and parking of fire fighting vehicles, ambulances, etc on the premises. The design and construction of every building structure should incorporate features of prevention of fire and fire loss: Considering the type & density of occupancy, lobbies, staircases, aisles, etc should be sufficiently wide to ensure easy movement of traffic at all times and at the same time to permit easy and orderly evacuation during emergencies.

The design of the building structure should be so planned that it allows pressurised exclusion of smoke in case of fire or any smoke leak. Adequate emergency rescue aids and suitable refuge areas should be incorporated in the design. The critical areas should be well protected with such measures and extra precautionary measures should be implemented in such critical areas, e.g. use of fireproof doors.

Practicing fire safety in a hospital is key to patient safety. After taking adequate precautionary measures in the conceptual and design stage itself, there is a need to implement safety measures and protocols in the infrastructure: Prepare a guideline manual to be followed by all the staff for prevention and precautions against fire and related accidents. A manual stating actions/steps to be taken in case of emergencies should be effectively designed and followed stringently by all. The staff should be trained to handle such emergencies and chaotic situations.

Planning for fire safety can be divided into five steps: minimizing the chance of fire, early discovery, restricting fire spread, extinguishing the fire, and evacuating the building.

Minimizing the chance of fire: The most effective contribution the building designer can make toward fire prevention is in the selection of proper materials and equipment. All materials used in building a hospital should be incombustible.

Early discovery: Although elementary, it is important to realize that almost all large fires start from small ones, for this reason, the earlier the fire is discovered, the sooner extinguishing action is begun, the smaller the danger. Several basic types of systems are available and can be classified as follows; smoke-detection alarm, heat-actuated alarm, automatic water-sprinkler, and automatic chemical extinguishing. All hospital buildings (except the very smallest ones) should be provided with an internal fire alarm system. Such a system gives immediate notice to the hospital staff and employees and all other building occupants of a fire on the premises. Each hospital is required to have a fire detection, fire alarm, and fire suppression system in place. Building Codes including Fire Codes are essential for obtaining permission to operate a Health Facility. Patient safety is a legal necessity.

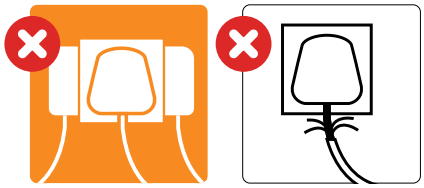
Preventive measures

Kitchen

In addition to routinely checking the kitchens, especially during meal prep times, make sure that your staff is fully aware of your facility's fire safety plan. If fires do occur, employees need to be able to react calmly and quickly so that the fires do not spread beyond the kitchen.

Routinely check electrical outlets and wires

Cooking fires, despite occurring often, are usually confined to a single appliance or room. The same can't be said for fires caused by electrical malfunctions.



One out of five non-confined fires (fires that spread beyond their point of origin) were the result of broken wiring or overloaded outlets.

Cords that do need to be used must be in good condition and need to be away from flammable materials. Do not run a cord through a window, wall, or doorway and do not put it underneath a carpet or rug.

If you're stuck using cords, ask yourself the following questions regularly:

- Are any cords split or cracked?
- Are any plugs in bad condition?
- Are any cords or plugs overloaded?
- Are cords in an area where they could be stepped on?

Multi-plug adaptors, which allow several appliances to be plugged into the same outlet, run the risk of overloading the outlet. Make sure that certified electricians are the only ones who are setting up, monitoring, and maintaining your facility's electrical system.

Never let smoking and oxygen to mix

Smoking in healthcare facilities is never a good idea, but this is especially true nearby of oxygen-dispensing machines.

This is particularly dangerous because when there is more oxygen in the air, fires can burn easier, quicker, and hotter than usual

Follow strict no-smoking policy inside the hospital.

Install wet-pipe sprinkler systems

Wet-pipe sprinkler systems are recommended because they discharge water immediately as soon as the sprinkler detects the heat of a fire.

Train your staff to operate and inspect portable extinguishers

While automatic sprinklers and extinguishers are important, it's better to combine these with manual, portable fire extinguishers. The staff must know how to use these extinguishers when needed.

More importantly, the extinguishers should be inspected each month to ensure they're in working order. Try this series of routine procedures to visually inspect fire extinguishers:

- Are all extinguishers in the correct location?

- Are they easy to get to? Is anything blocking or obstructing them from view?

- Are any safety seals missing or broken?

- Are any of the extinguishers damaged on the outside?

- Are any of the nozzles leaking, corroded, or clogged?

- Are pressure gauge readings in proper position?

- Are the instructions easily seen and legible?

- Are the extinguishers full? (Test by lifting and/or manually weighing).

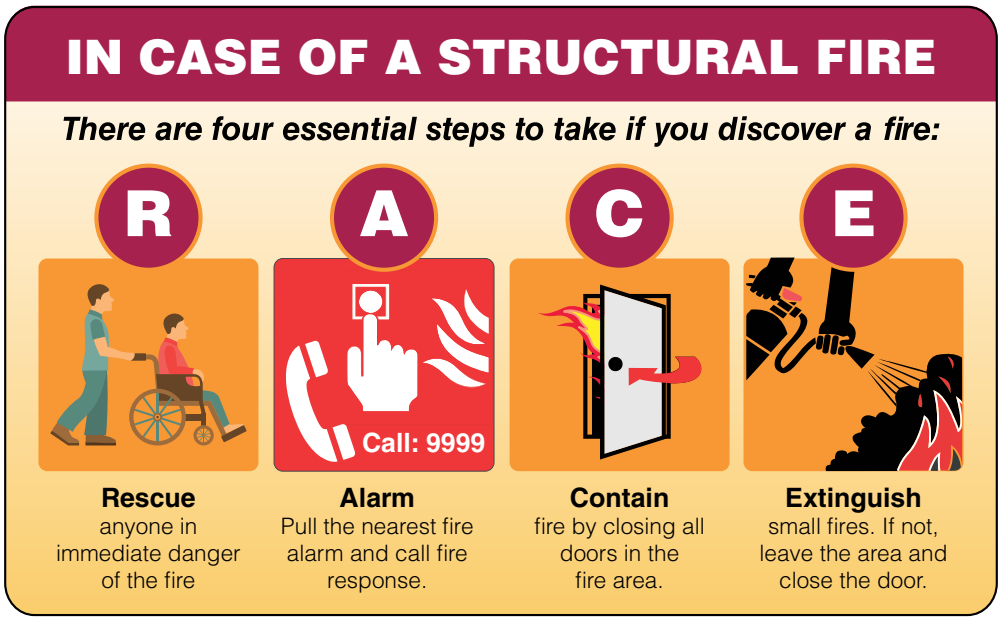
If any extinguishers fail the monthly visual inspection, replace them immediately. In addition, be sure that you bring in a certified inspector to perform more in-depth annual maintenance.

Develop an action plan

Hospital facility managers must create and distribute a fire safety plan that details what to do in an emergency. All employees need to stay calm and be on the same page if a fire occurs.

One of the recommended methods is the RACE (Rescue, Alarm, Confine, Extinguish) method, though there are many other techniques to choose from:

- Rescue any patients who are in danger
- Activate a fire alarm if you see a fire, or respond immediately when you hear an alarm
- Confine fires by closing off doors and hallways
- Extinguish small fires only; leave major fires for the fire department.


IN CASE OF A STRUCTURAL FIRE
There are four essential steps to take if you discover a fire:
R
A
C
E
Call: 9999
Rescue
anyone in immediate danger of the fire
Alarm
Pull the nearest fire alarm and call fire response.
Contain
fire by closing all doors in the fire area.
Extinguish
small fires. If not, leave the area and close the door.

Facility managers must own this safety plan and ensure that all staff are trained and fully aware of their responsibilities. Regularly perform fire drills and review meetings to keep this plan top of mind.

Fire safety in healthcare facilities requires vigilance and routine monitoring on the part of the facility management team. The seemingly monotonous practice of regularly checking cooking equipment, electrical wires, oxygen tanks, and fire extinguishing equipment can make the difference between life and death.

Operations and plans

Healthcare facilities must maintain emergency and evacuation plans, and employees must be regularly trained on these plans and their roles within them. Emergency plans should include instructions for fire emergencies and general building evacuations.

Quarterly evacuation drills are required for each shift, and records of these drills must be maintained. Additionally, hospital staff should be aware of and sustain general housekeeping standards. These activities include maintaining clear access to exits, enforcing “no smoking” policies, making sure decorations in halls and patient rooms are fire resistant and do not exceed allowed limits, and ensuring soiled linens and trash are regularly emptied and not permitted to accumulate beyond allowed maximums

Evacuation Plan

Guidelines for evacuation procedures to be followed in case of an internal disasters to protect patients, staff and/or visitors.

Procedure:

Evacuation maps should be positioned in the halls at critical points. Evacuation routes are indicated on the evacuation map. Patients threatened by smoke, heat, flame or other immediate danger will be removed to a safe location at the direction of the highest-ranking official at the scene.

Staff should follow the RACE procedure: Rescue, Alarm, Contain and Evacuate. It is unusual to evacuate an entire medical center. Most times a side to side horizontal evacuation is sufficient to meet patient care needs. Only under the order of Fire Department or Hospital administration would an entire medical center evacuation occur.

Responsibilities

A. The Administrator-on-Call, responsible for:

- Initiating the Evacuation Plan in collaboration with Fire Department, Facilities Management manager, Security Manager or Nursing Supervisor.
- Identifying safe locations to direct evacuees.
- Initiating the “All Clear” once the emergency is over.
- Arrange transport or transfer of patients to an area of safety or alternative care site designated by the Incident Commander and Inpatient Unit Leader

B. Employees are responsible for:

- Assisting in the evacuation as directed by the Administrator-on-Call.
- Conducting themselves safely and rationally during evacuation proceedings.

Decision to evacuate

The decision to evacuate an area of the hospital (horizontal evacuation) or the entire hospital (vertical evacuation) will be made by one of the following in collaboration with the others listed below:

- Fire Department in the case of unsafe building structure due to fire
- Administrator-On-Call or Incident Commander
- Nursing Supervisor
- Facilities or Security Manager
- Department Manager or Supervisor of affected area
- Police Department

General Procedures

- Patients in immediate danger should be moved first.
- They should follow a lead nurse into a safe area.
- Move patients who are closest to danger first (non-ambulatory and ambulatory).
- Direct ambulatory patients toward a safe area.
- Have wheelchair or walker dependent patients escorted to a safe area.
- Move stretcher or completely non ambulatory patients with Paralysis, Ferno Evacuation chairs, mattresses or blankets.

Types of evacuation

A. Horizontal Evacuation

For in-patient areas, which require limited evacuation, the following shall be included:

- Follow evacuation maps, if appropriate.
- Move ambulatory patients, visitors and unneeded staff horizontally (on the same floor) to an area of refuge beyond a set of fire doors and close the doors upon completion.
- Move patients in order of most easily relocated or most ambulatory to most critically ill. Critically ill patients should be moved by House Staff and Nursing in conjunction with the Fire Department, if feasible.

- Use wheelchairs to move these patients. Wrap patient in blanket before placing patient in wheelchair. After getting them to a safe area, patients should be removed from the wheelchairs, if possible, and made comfortable. The wheelchairs should then be taken back for other patients.
  a) Check with your supervisor to see if specialized evacuation equipment is available for your area (e.g. aprons to transport babies, evacuation chairs).
  b) Staff should know the location and proper method for using such equipment in an evacuation. Remember, two people to carry a person down the stairs may use chairs.
- Neonatal Intensive Care Unit has specific evacuation equipment appropriate for the population (baby Weevac sled and kangaroo pouches)
- An assigned person should check each room of the evacuation area to assure all persons have left the area.
- Track numbers of patients who have been evacuated and keep track of each unit – House Supervisor will be asking for numbers of patients evacuated from each unit

B. Vertical Evacuation

- Vertical evacuation shall be used if horizontal evacuation is not an option. The priority for evacuating patients shall be the same as described in horizontal evacuation.
- Evacuation shall be to a lower floor except at street level or lower in which case evacuation should be out of the building.
- Wheelchair cases are to be evacuated to the elevators, providing smoke and fire conditions permit, and the use of the elevators is authorized by the Fire Department Official on the scene. Elevators may not be used for evacuations unless advised by the Fire Department before using.
- Specialized evacuation equipment, if available for your area (e.g. aprons to transport babies, evacuation chairs) should be used. The staff should know the location and proper method for using such equipment in an evacuation. Remember, two people to carry a person down the stairs may use chairs.
- Use stretchers if available; if not, place patient in blanket on floor, roll in top corners of blanket and pull the patient head foremost to a safe area on the same floor or if vertical evacuation is indicated, use an authorized elevator. In the event elevators are not to be used, patients are to be evacuated down the nearest stairway utilizing evacuation sleds and chairs.

Education & Training

New staff should receive emergency preparedness training at hospital orientation. All staff should receive emergency preparedness training annually with the self-learning manuals. During department orientation and training, staff should learns about their department's role in emergency preparedness, emergency response plan and department specific evacuation plans. Evacuation and fire route training should happen every year for staff to familiarize fire doors, exits, meeting places and stairwells.

AGRICULTURAL FIRE SAFETY

Farmers in many parts of the world set fire to cultivated fields to clear stubble, weeds and waste before sowing a new crop. While this practice may be fast and economical, it is highly unsustainable, as it produces large amounts of the particle pollutant black carbon and reduces the fertility of soil

The environmental and human costs of agricultural open burning far outweigh the near-term economic benefits for farmers.

Open burning is the single largest source of black carbon, a short-lived climate pollutant that contributes to air pollution, and one of the largest causes of air pollution-related illnesses.

Successive fires destroy the organic matter that makes soil fertile, causing crop yields to decrease over time and increasing the need for costly fertilizers. Smoke and spreading flames also pose a risk to neighboring communities, buildings, and fields.

Agricultural Fire Safety

The leading cause of agriculture fires is open flame caused by candles, matches, bonfires, sparks, static electricity, friction, welding and equipment. Other causes of fires may include natural resources such as spontaneous combustion and lightning.

Control of fire hazards

Cut down and remove weeds and brush from around buildings. In buildings, check for excessive accumulation of dust, feathers, cobwebs, and other potential combustibles. Reduce and keep away from heat unneeded items that will burn. Arrange the sheds and stores so that flammables are safely away from ignition sources. Use approved electrical installations including proper fuses or circuit breakers, waterproof outlets, enclosed electric motors and similar equipment in any buildings which are cleaned periodically with high-pressure equipment.

Inspect all wiring and electric motors and appliances for exposed wires, broken insulation, improper grounding and incorrect installations used in the farming industries.

Air conditioners: service the air conditioners regularly in the rooms in the farm.

Minimize hazards on site

Strictly enforce a no smoking rule inside a building or areas where flammable and combustible materials are stored or near storage, shipping or receiving areas where boxes or other containers can easily start a fire. Keep flammable liquids away from open flames and motors that might spark. Never smoke when refueling.

When transferring flammable liquids from metal containers, bind the containers to each other and ground the one being dispersed from to prevent sparks from static electricity. Clean up spills right away and put oily rags in a tightly covered metal container. Change your clothes immediately if you get oil or solvents on them.

Flammable liquids should be marked and stored in approved containers in well ventilated areas away from heat and sparks. Keep above ground fuel storage tanks at least 40 feet from buildings.

Machinery

Re-fuel machinery with care. Watch for and repair leaks in fuel lines, carburetors, pumps, and filters. Keep engines properly tuned and timed to avoid backfiring and exhaust systems in good condition to avoid sparks. Keep machinery properly lubricated to minimize friction.

Hot work

Always have a fire extinguisher on hand during hot work, that is, when using an open flame or near a heat source. Watch for molten metal as it can ignite flammables or fall into cracks and start a fire that might not erupt until hours after the work is completed. Use portable cutting and welding equipment in clean work areas.

Keep flammables at least 35 feet (1066.8) from a hot work area. Be sure other tanks and other containers that have held flammable liquids are completely naturalized and purged before you do any hot work on them

Spontaneous combustion

Many materials under certain conditions heat spontaneously. Store vegetable and animal oils and paints or linseed-soaked rags in sealed containers in cool, well

Ventilated places away from other combustibles. Avoid storing wet hay and check stored hay for warm spots. If hay temperature is noticeably warmer than when it was put in, watch it closely. If the temperature reaches 175 degrees F (79.44 C°), get the hay out or divide it into small, shallow stacks.

VEHICLE FIRES AND HOW TO PREVENT THEM

Vehicles are used in one form or other, across all industries, also is most important for people movement. From businesses that employ the use of the odd road vehicle to those who rely constantly on a fleet of industry-specific vehicles such as diggers or combines, and cars owned by individuals. Losing them to fire can be devastating both financially and emotionally.

One of the biggest risks facing vehicles is the outbreak of a fire. It doesn't take long for a fire to spread and gut a vehicle, rendering it beyond repair and putting the driver – as well as the public – at risk.

This can be disastrous for a business, as it means losing vehicles essential to everyday operations. Even if the vehicle can be repaired or replaced, the cost is such that it could heavily impact the finances of your business – especially if it involves downtime, delaying orders, and projects company-wide.

How do vehicle fires happen?

The problem is related to the formula for fire- Fire triangle. Fuel, heat, and oxygen are needed to create a fire and vehicles hold one of these in large quantities. From oils and lubricants to gasoline, there are highly flammable chemicals everywhere – these are the fuel for the fire. Vehicles also produce another side of the triangle regularly: heat. So with only oxygen left, which is all around us in the air, a vehicle fire is never far away.

So now we know that the three elements of the fire triangle are readily available, what are some of the common causes of vehicles fires?

Lack of Maintenance - If you don't keep on top of a vehicle's maintenance you will find, eventually, something essential will deteriorate that stops the vehicle from functioning properly. Bad wiring and leaky parts are just some ways in which not taking care of a vehicle can lead to a fire.

Spilled Fuels - Whether this is the fuel used for the vehicles themselves, or flammable liquids being carried as cargo, any fuel which is spilled onto the road or internally under a vehicle's chassis can be a recipe for disaster. Securing flammable liquids and ensuring there are no leaks in your vehicles can help reduce this risk.

Electrical Failures - There are so many electrical components to a vehicle and it only takes a single spark to ignite a fire. Special attention should be paid to your wiring regularly; just as you would have your appliances and other equipment tested, you should also test your vehicle.

Preventing Vehicle Fires

It is important to know what to do in the event of this emergency, prevention is a key component to ensure your safety.

Vehicle fires can break down for many reasons. Smoking, overheated tires, dragging breaks, faulty wiring, or exhaust system failures are just some of the causes of vehicle fires. It's important to exercise the following prevention techniques to ensure your safety.

Any driver needs to be familiar with the potential risk of fire, how to reduce those risks and what to do in an emergency. When a fire starts in your vehicle and you are carrying cargo, immediately evacuate, call emergency personnel, clear the area, and alert other motorists.

Smoking

- Never smoke while transporting hazardous materials. Even if you are not carrying this type of load, it is wise to avoid smoking.
- If you are going to smoke, put out your cigarette or cigar in the ashtray instead of throwing it out the window.
- Exercise caution when disposing of ashes, butts, and matches.

Brake System

- Dragging the brakes often without a reason may ignite a fire.
- Get it checked with the workshop and report any suspected alignment and wheel bearing damage.

Exhaust System

- Check your exhaust system monthly. A small hole in the system is dangerous, as hot gases can combine with accumulated grease and oil and cause a fire.

Wiring

- Conduct monthly inspections of all battery cables. This includes looking for:
- Frayed cables
- Missing cable tie-downs
- Missing grommets
- The buildup of grease and dirt

If your vehicle is equipped with a battery disconnect switch, it is required that you enable the switch any time your vehicle is in the park.

Tires

Check tire pressure before and after each trip. If your tires are under-inflated, the casing of the tire tends to bend and move as you drive. This friction causes the tires to get very hot and can cause a fire.

In the event of a Vehicle Fire

In the event that a fire does occur while you are driving, stop the vehicle immediately as far off the road as possible and get out. Do your best to stop the vehicle in an open area away from buildings, trees or other vehicles. Call emergency personnel and do your best to stop traffic at least 2,000 feet around your vehicle.

If the fire is located in your tires, douse them with water, your dry chemical extinguisher, or dirt. Every vehicle is required to carry a fire extinguisher. Familiarize yourself with its location and how to use it.

If the fire is located in the engine, use your dry chemical extinguisher but do not open the hood. Lifting the hood will fuel the fire with additional oxygen. If the fire is out of control, do not attempt to do this. Get away from the vehicle and wait for emergency personnel.

Vehicle Fire Prevention Tips

Vehicle fires are commonly caused by mechanical or electrical failures or as the result of a crash. Inspect your car occasionally and take it to a qualified mechanic for a yearly tune-up. Regular car maintenance can help spot hazardous problems such as frayed or loose electrical wiring.

Use the following tips to prevent potential vehicle fires:

- If you notice any fluid leaks or your fuel levels drop rapidly, have your car checked. Leaking oil or fuel can spark a fire.
- Secure your oil and gas caps properly.
- Pay attention to if your vehicle is overheating. A hot engine can cause fluids, such as oil or coolant, to leak. When fluids drip onto hot areas of the engine, they can start a fire.
- If your exhaust system is too hot, have it checked. The normal temperature range of an exhaust system is 300-500 degrees Fahrenheit. If the catalytic converter is clogged or over-labored, it can reach scorching temperatures of 1,200 degrees or higher. An overheating catalytic converter that comes into contact with dry grass or any flammable material can spark a fire.

- Do not smoke in your car. Cigarettes are a common cause of fires, including in vehicles. Embers may fall on the seat or floor carpet and start a fire. If you can't wait until you arrive at your destination to smoke, pull over in a safe place to smoke, and extinguish your cigarette properly.
- Do not leave flammables, such as cans of gasoline, lighter fluid, or aerosol cans in your car. If you are transporting gasoline, do so in a certified gas can that is sealed and transport it in the trunk, not the passenger compartment.

What to do if your car catches fire

Most people don't expect their car to burst into flames, but it can happen—including occasionally with a manufacturing defect as the cause. (In 2019, Companies like Hyundai and Kia recalled over 500,000 of its vehicles due to an engine fire risk).

If your car does catch fire, this is a dangerous situation. A fire can spread from the engine to the passenger compartment in under 20 minutes. If you smell gasoline, burning rubber, burning plastic, or see smoke or flames, take action immediately. Below are the steps to take.

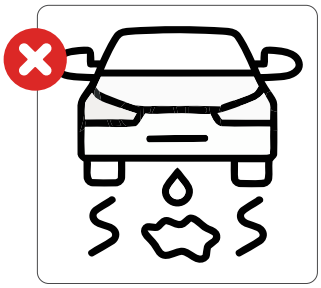
1. Pull to the side of the road and turn off the engine.
2. Get out of the car immediately and move at least 100 feet away. Do not return to the vehicle to retrieve anything. A burning vehicle could explode at any second.
3. Warn pedestrians and other drivers nearby to keep clear of the vehicle.
4. Never open the hood or trunk to investigate. Touching a hot hood could result in severe burns. Opening the hood or trunk also lets in a rush of air that can increase the flames and intensity of the fire.
5. Call 9999

In addition, keep a fire extinguisher in your car. If used promptly on a small fire, a fire extinguisher—approved for Class B and Class C fires—can be effective in putting out flames before they become larger and out of control. Always practice safe driving to avoid collisions.

Car Fire Safety Tips

If you want to avoid a vehicle fire, take these precautions:

- Do NOT smoke in your car
- Do NOT leave flammables in your car (e.g. gasoline, explosives, lighter fluid, aerosol cans, nail polish, alcohol, etc.)
- Scan the area for fire hazards like downed power lines or storm damages to infrastructure
- Limit reckless driving
- Check for damaged or loose wiring
- Check for oil or fuel leaks
- Maintain your car battery
- Respond immediately when a strange odor (e.g. gasoline, burning rubber, and burning plastic), smoke or flames are present. A clear indication is if it comes from under the hood or wheel area.



If you find yourself already in a fire, follow these steps:

- **Move** to the right and stop your car on the shoulder or breakdown lane
- **Turn** off the engine
- **Exit** the vehicle
- **Warn** others to stay away
- **Notify** the fire department or call 9999

KEEP CHILDREN SAFE FROM FIRE AND BURN

Make an escape plan

It is important to have a plan when there are children in your home. Children sometimes need help getting out of the house. They may not know how to escape or what to do unless an adult shows them.

- Have a plan for young children who cannot get outside by themselves. You will need to wake babies and very young children and help them get out. In your plan, talk about who will help each child get out safely.
- It is important to find two ways out of every room in your home, in case one exit is blocked or dangerous to use.
- Choose a meeting place outside your home. Children should know what to do when they hear a smoke alarm and there is no adult around. Help them practice going to the outside meeting place. Teach them to never go back inside a building that is on fire.

Keep children safe from fire and burns

Some children are curious about fire. There are simple steps you can take to keep you and the people you love safer from fire and burns.

- Keep children 3 feet away from anything that can get hot. Space heaters and stove-tops can cause terrible burns. Keep children at least 3 feet away from stoves, heaters or anything that gets hot.
- Keep smoking materials locked up in a high place. Never leave cigarette lighters or matches where children can reach them.
- Never play with lighters or matches when you are with your children. Children may try to do the same things they see you do.

Top Fire Safety Tips for Kids

As a parent, you will always be concerned about your child's health and safety. Children are often told to be careful about their surroundings and be safe, yet they tend to fall, slip, and get hurt while playing. As a parent, it is up to you to educate your child about fire safety measures and ensure they follow them.

One of Mother Nature's most useful yet unforgiving products is fire. It can occur without any warning, at any given time! The most common cause is short-circuiting, and the first reaction when there is a fire is panic.

Parents, while teaching kids fire safety, the most crucial rule is not to panic! Children can follow these tips to keep safe and prevent any damage during a fire outbreak.

- **Safety Talks with Your Child**

  The first tip for fire safety is to educate your child about the importance of their safety. Talk to them about what happens during a fire, and how they must keep themselves safe at all costs. They should be aware of all preventive measures and how to be safe around fire.

- **Avoid Playing with Lighters and Matches**

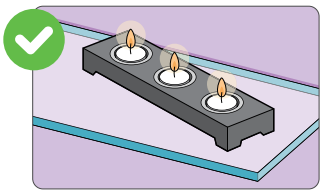
  Children must be forbidden from playing with matches and lighters. Unless they are under adult supervision, they must not be allowed to use these items and even then care must be taken to avoid any accidents.

- **Double Check Extinguished Matches**

  Once a match is lit and extinguished, make sure you run it under water to ensure the match has been put out completely. This will ensure that the trash does not accidentally catch fire. Older children or young adults must practice this rule. Since this tip is easy, children will be able to grasp and follow it easily.

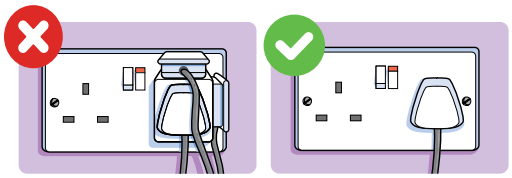
- **Be Mindful of Burning Candles and Incense**

  Teaching your children, young and old, to be careful not to leave burning candles and incenses around, is essential. Leaving exposed heat is a fire hazard waiting to happen. Tell your child always to be careful whenever leaving a room, and to extinguish the flame or the lit-up item.



- **Avoid Over Plugging**

  With many electronic devices in a household, educating your children on the number of devices per power outlet is essential. They must refrain from plugging in too many appliances into one outlet as it could lead to a short circuit.



- **Stay Away from Stoves**

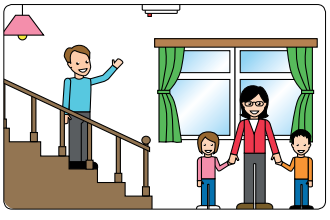
  It's never safe for children to be close to fire sources, like the stove. You must tell them that playing around these places could pose a severe health hazard and is extremely dangerous.

- **Caution Around Flammable Objects**

  If your children are learning to cook, make sure you inform them to keep any flammable objects away from the stove. They must be cautious while using things like towels and oven mitts that can catch fire instantly.

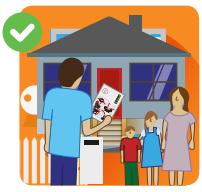
- **Fireproofing the House**

  Ensure your child is aware of the dangers of playing with or near fire or an open flame. Install fire alarms in your house and ensure it works by



changing its battery every six months. It's good to invest in a mini fire extinguisher, and it is important you teach your children how to use it in case of a fire. Also, make sure all the wiring around the house is properly covered.

- **Execute a Fire Drill Plan**



Fire drills will always help your children understand what must be done in case of a fire outbreak. Map out a plan and execute it a few times; this will help them overcome a scary situation, and know what to do at the time of an emergency. Also, make sure that you sketch out a designated safe place to meet up, in case you are separated during the exit.

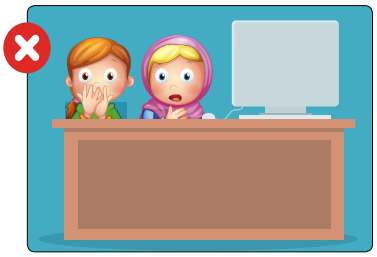
- **Get Low and Exit**

In case of a fire, your children must know to get low to avoid the smoke and to find the closest exit and leave the place. During the fire drill practice, ensure they crawl and leave the area safely.

- **Stop, Drop, and Roll**

One of the most important safety tips your child must implement if their clothes catch fire is to Stop, Drop and Roll! Rolling will help put out the fire and tell your child not to run around because it will make the fire spread faster. Make them practice this with you diligently, and it could end up saving their lives!

- **Do Not Hide Inside**

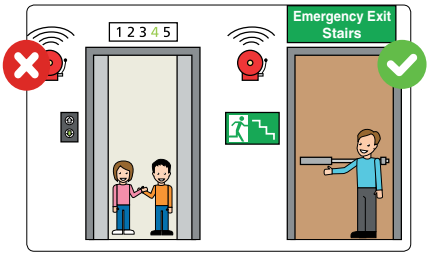


Your children must know that in case of a fire, they should never look for places to hide. Finding the nearest exit and leaving is important, so show them all the possible ways of getting out of the house.

- **Leave Everything Behind**

During a fire, the first priority should be to exit the building. This means you must leave all your possessions behind and get to safety. Do not run back inside a burning building to retrieve anything, since your life is more important.

- **Avoid Using the Elevator**



When there is a fire in an apartment, it is essential that your child knows not to use the elevator. Explain to them that during a fire, they must use the stairs to exit the building. The elevators may stop working, and they could get stuck inside.

- **Knowing the Emergency Numbers**

Teach your child that in case of a fire, they must exit the building as practised, and reach the designated safe place. Once they get there, they must call the emergency helpline such as the police or the fire department for help and assistance.(9999)

Children are often easily scared during an accident, and speaking to them about their safety will help them remember the tips you share with them during a fire outbreak. Always tell them to be alert and trust your children to be responsible.

FIRST AID AFTER A FIRE ACCIDENT

Fire is a dramatic disaster not only because of its devastating effects on property and individuals but also, because of the panic it creates in all those who suddenly find themselves face to face with the spread of flames.

In the presence of fire, a certain degree of panic is the most natural, almost physiological reaction, occurring in every living creature from insect to man.

An initial moment of psychological paralysis is common in all persons, followed by a total inability to think rationally, which in turn leads to acts of instinctive behaviour with a single aim: escape to safety.

This sequence of actions only worsens the amount of damage caused and creates an even more dramatic and catastrophic situation. This may indeed be the only reaction possible in animals, which are purely instinctive, but in man, who possesses reason, there is another option which at first sight may seem almost impossible, to keep calm and take rational decisions. This can be achieved in one way only, through information about the risks involved, a thorough understanding of the dangers, and through instruction about how to behave in case of fire.

Burn disaster

Whether a fire disaster strikes a building, a hospital, an airport, a ship, a factory, a sports stadium, or a campsite, it is inevitably a highly devastating event because of the social and public context of these structures.

The extent of the disaster is determined by the distribution of material goods and, above all, by the number of persons involved. Those who escape death may suffer extensive burns which may be immediately life-endangering.

Some information about specific aspects of burn pathology, such as may occur in fire disasters, will help in the understanding of this definition:

- The inhalation of combustion gases, fumes, and hot air can cause life-endangering damage to the airways, even if the actual burns are limited in extent.
- Burns involving more than 20% BSA (Body surface area) in the adult and 15% BSA in the child causes a progressive state of hypovolemic shock(Hypovolemic shock is a life-threatening condition that results when you lose more than 20 percent (one-fifth) of your body's blood or fluid supply) requiring

aggressive fluid resuscitation within the first three hours.

- The burn is often associated with other trauma (fractures, wounds, electrocution, etc.) which may complicate the chance of recovery, if not treated in good time.

Immediate care and first aid

The characteristics of relief activities in a burn disaster are closely linked to the particular nature of the damage that fire causes in living persons and material goods, the manner of its occurrence, the dangers to which the rescue workers are exposed, and the specific type of care that has to be given to the victims.

The timeliness and the effective impact of relief work depend on both general and local factors.

In the specific case of the "burn disaster", as defined due to particular circumstances

- The moment when the disaster occurs (night, day-time, public holiday, unfavorable weather conditions),
- The place of the disaster (residential area, skyscraper, isolated locality),
- The degree of accessibility, and the distance from operational rescue forces

All three factors are important because any delay will prevent relief work from being immediately available.

A decisive role is therefore played by local intervention factors which chiefly depend on the behaviour of the people present at the scene of the disaster, and on the action of the operative teams that arrive rapidly on the scene.

The burn disaster, therefore, requires well-defined chronological and qualitative operative phases. A person with burns of the airways and associated trauma needs immediate care of a different type from that of an earthquake, flood, or cyclone. It is also of fundamental importance, for obvious reasons, that pending the arrival of professional relief, some medical and/or surgical first aid must be given within a very short time at the accident location. The chance of burn disaster victims is thus dependent on the preparedness of the people at the fire emergency and by the operational capacity of volunteers, physicians and nurses present in the area or in the immediate vicinity who have received previous training in this specific type of relief work. If people are to be able to give immediate care either to themselves or to others, they must know precisely what they have to do, they must have information not only about behaviour guidelines that will enable them to save themselves (self-rescue) but also about some elementary principles necessary for immediate help to others.

Ten guidelines for the immediate care of burn victims by rescue workers

1. Self-control

The first rule to follow in the event of a fire is: "Don't Panic". Rescuers must behave rationally and avoid any heedless action. The first thing to do is to examine the situation, assess the gravity of the fire, and opt for the appropriate behaviour. To help others one must first be able to protect oneself

2. Self-protection

Rescue workers must know how to protect themselves from flames, fumes, toxic gases, falling masonry, and other hazards to their safety.

Therefore they must:

- No walkover ground covered with easily flammable material (paper, sawdust, brushwood, etc.);
- Keep away from anything containing a flammable liquid that might explode. Open containers holding liquids that burn at low temperature (e.g. petrol or kerosene) radiate heat that may be sufficient to ignite them;
- not cross floors or lofts, or use stairs, or walk under ceilings exposed to the flames;
- not stand downwind from the flames and must anticipate a sudden change in the direction of the fire. Even in the absence of wind, crossing zones exposed to air currents (tunnel exits, air-shafts, narrow passageways) becomes risky; consider the possible direction in which the fire may spread to protect themselves from the flames;

- if possible, use protective clothing and devices: for example, helmets, which protect the head and prevent the hair from catching fire; dark glasses, even ordinary sun-glasses, to protect the eyes from glare, sudden blazes, and flying flaming particles; gloves, a welder's apron, etc.; a safety-belt, if available, which can be worn and tied to a rope held by another rescue worker, when carrying an injured person; and dust-masks, which prevent the inhalation of solid particles liberated by the fire and thus prevent irritation phenomena of the upper airways.

3. Diminishing the action of the fire

Pending the arrival of the fire brigade the rescue worker must:

- evacuate all people at risk, beginning with those in places most immediately threatened;
- remove from the area of the fire all flammable material, gas cylinders, etc.
- switch off ventilation and air-conditioning systems to keep out fresh air which feeds the fire and to prevent the flammable and toxic gases and vapors from spreading;
- switch on any fixed extinguishing equipment such as water-jets and sprinklers;
- use correctly the available portable fire extinguishers;
- avoid using water to extinguish flames on or near electric plants (the material that such structures are made of can react by considerably increasing in temperature or by releasing flammable and noxious gases).

4. Extraction and transfer of victims to the open air

Before entering a burning room one must:

- put a wet cloth over the mouth, or wear a gas mask;
- enter the room on all fours and crawl forward in this position, as smoke tends to rise;
- if there are flames in the room, wrap oneself in a blanket and advance on all fours;
- crawl backward down any stairs to avoid tripping;
- before a closed door, feel the handle or the door itself before opening it; one could be caught in a blast of flames and smoke as soon as it is opened;
- watch out for glass surfaces (doors, windows) because the heat and pressure generated by a fire can cause them to explode;
- approach cautiously air-shafts or small rooms without any ventilation. Before doing so, a rope guide is useful;
- avoid passenger or goods lifts as a power breakdown can transform them into traps and they also become flame shafts;
- if trapped in a room remember that the best thing to do is to shout for help from the window;
- not stay any longer than necessary in a room, not be too sure of oneself, in other words not do anything rash.

5. What to do when clothing is on fire

It is extremely distressing to feel oneself wrapped in flames or to see another person transformed into a human torch. In these circumstances it is more than ever essential to remain calm and to know precisely what to do:

- To extinguish flames in one's clothing, one must clasp one's arms around the chest, and roll about on the floor;
- To extinguish other people's clothing, it is best to throw them to the ground (tripping them up if necessary), to get them into a horizontal position, and to wrap them in a blanket or carpet or any other heavy material that can be rolled up (if they remain standing or sitting the flames will rise to their face and inevitably they will inhale hot air, smoke, etc.);
- Burning to clothing should not be extinguished with violent jets of water aimed directly at the person: this can increase pain and the state of shock. Jets of water containing large amounts of oxygen can increase the combustion of petroleum and synthetic clothes.

6. Removal of burning clothing

It is advisable:

- to cut away belts, sleeves, and tight clothing with great care;
- to remove rings, bracelets, and other constricting items: as the burn edema develops these can cause ischemia;
- not to tear off violently clothing, especially socks and shoes, adhering to burned surfaces, as this would also tear away skin that would be useful in the healing process;
- to remove at once, having first cooled them, if possible, with cold water, also the clothes impregnated with boiling liquids to be treated with the same way.

7. Emergency treatment of burned areas

To prevent burn lesions from deteriorating, it is essential:

- Not to burst any blisters, or remove the epidermis. Exposure of the dermis only increases the loss of body fluids and heat, besides increasing pain and the risk of infection;
- To cool the burned parts with water or a wet cloth. This stops the action of the thermal agent and considerably reduces pain. Very extensive burns must be treated either by immersing the part in water at room temperature or by covering the part with a damp cloth. The cooling operation should generally not exceed 20 minutes. It should be guided by the patient's general condition and the degree of pain relief achieved. Cooling a patient must be stopped if he begins to shiver, as this can lead to hypothermia. Children and elderly persons and those in a state of shock must be treated with even greater care, with less energy and shorter cooling. Non-extensive burns can be soothed with ice-packs or by placing the part under a running tap;
- to use clean plastic bags, if available, to wrap burned hands and feet, or to spread out like adhesive flaps over burns on the thorax, limbs, etc.;
- to wrap burned parts or the entire body in a freshly laundered dry sheet, towel or cotton or linen cloth, and not to apply dressings as these would cause constriction as the burn edema increases;
- Not to medicate burned parts with ointments or other drugs as these would only mask the picture.

8. Pending more complete relief

It is necessary to:

- check for other associated trauma, such as bleeding, fractures, head injury, and respiratory distress;
- use a belt, cord, etc., as a tourniquet to stop hemorrhage;
- plug the wound with a tampon, if available;
- lay the patient flat and apply splints to fractures;
- clear the airways by extending the head of the victim and to begin mouth-to-mouth respiration;
- Give just coffee or tea or even a little water (but not more than 100-150 cc). Stop giving liquids if the patient vomits. No alcohol;
- keep the patient warm by covering him with a blanket;
- Reassure the patient.

9. Chemical burns

The following three rules are helpful**:**

- First, wash the part that has been exposed to the chemical with copious amounts of water (eyes and face with greater care). Remove impregnated clothing and wash any parts previously covered;

- Without delay establish the chemical's pH by one of the following simple tests:
  - Tip- of- the- tongue test. Touch the burned skin and place the finger on the tip of the tongue; if the chemical is acid, there will be a bitter taste; if it is alkaline there will be no particular taste but a pungent and dry sensation. This test is safe and reliable.
  - Saliva test. Spread a little saliva with the fingers over the burned skin. If the chemical is alkaline a soapy emulsion will form between the fingers. The acid will cause no reaction.
  - Bicarbonate test. Sprinkle some bicarbonate over the burned skin. An acid, not an alkali, will produce effervescence.
- If possible, apply mildly tamponading substances to the washed parts: kitchen vinegar (1 acetic acid) diluted with 50%. Water in alkali bums; household sodium bicarbonate (two teaspoonful in a liter of water) for acid burns. The eyes must be washed using water only.

It is important to obtain all information on the nature of the chemical and to relay it to the hospital where the victim is taken so that the appropriate antidote can be applied.

10. Electrical burns

When faced with a burn due to electrical power it is necessary to:

- Switch off the current if the victim is still in contact with a conductor. If this is not possible, and if the current is less than 500 V, separate the part of the body in contact using a pole, broom-handle, wooden plank or any other insulating material, or with insulating gloves, rubber shoes, etc.;
- Lay the victim flat on the ground;
- If fainted but breathing, lay him on one side;.
- If unconscious and not breathing, place one hand under the back of his neck and stretch the head back. This will allow air to pass through the upper airways which have been obstructed by the root of the tongue or by the dropping of the jaw;
- If still not breathing, start mouth-to-mouth respiration immediately;
- If unconscious, not breathing, no carotid pulse and dilated pupils, start artificial respiration and external cardiac massage and continue until medical relief arrives.

There is an absolute priority for hospital transfer.

FIRST AID FOR BURN INJURIES

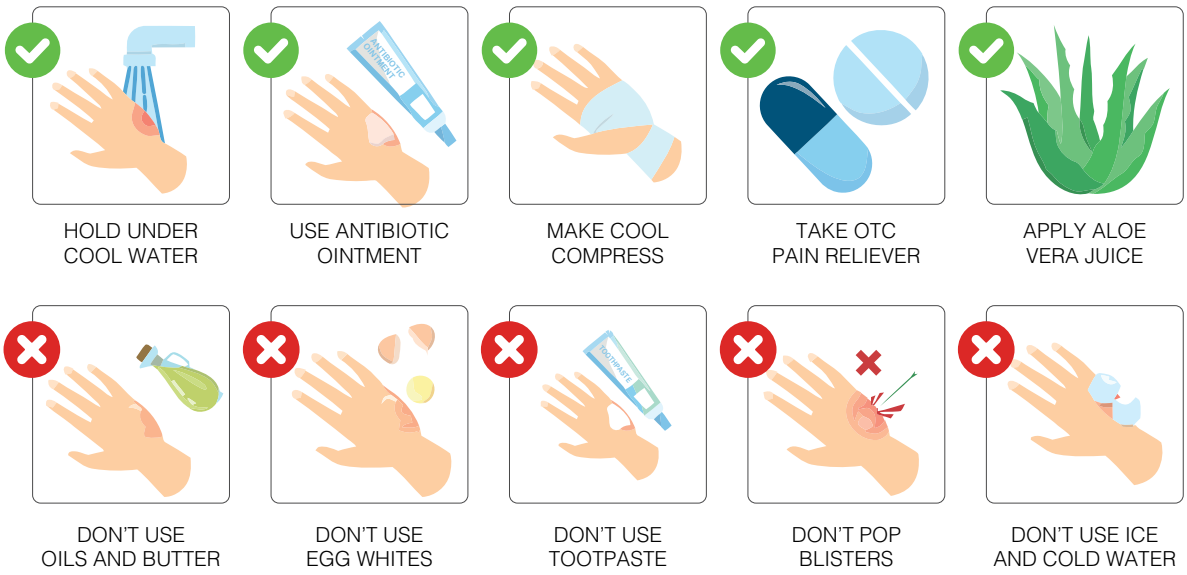
Burns and scalds in young children often occur in the home and are usually caused by hot beverages, hot tap water, saucepans of hot liquids and boiling water in kettles.

If on fire

- Stop, Drop, Cover and Roll
- Smother the flames with a blanket
- Move away from heat source

First aid for burn injuries

- Protect your own safety at all times
- For all burns apply cold running (tap) water for at least 20 minutes
- If running water not available, wet 2 cloths and alternate them onto the burn every 2 minutes
- Keep the rest of the body warm
- Do NOT use ice, butter, creams, etc.
- Remove clothing and jewellery as they can hold heat on the burn and jewellery can stop blood flow to the burn.
- Seek medical attention for any burn bigger than a 25 baiza coin, or blisters that appear or if there are any other concerns.



Ensure that all adults in the household know and understand proper first aid. Where appropriate, children should be taught general first aid principles.

Scald burns from hot water and other liquids are the most common burns in early childhood. Because burns range from mild to life threatening, some can be treated at home, while others need emergency medical care.

What to Do

If your child is severely burned, **call 9999 right away**. While you wait for help, begin these treatments:

Remove clothing from the burned areas, **except clothing stuck to the skin.**

- Run cool **(not cold)** water over the burn until the pain eases.
- Lightly apply a gauze bandage or a clean, soft cloth or towel.
- **Do not put any ointments, butter, or other treatments on the burn** — these can make it worse.
- **Do not break any blisters** that have formed.

Get Emergency Medical Care if:

- The burned area is large (cover the area with a clean, soft cloth or towel).
- The burns came from a fire, an electrical wire or socket, or chemicals.
- The burn is on the face, hands, feet, joints, or genitals.
- The burn looks infected while it is healing. Signs of infection include swelling, pus, or increasing redness or red streaking of the skin near the burn area.

Think Prevention!

- Be careful when using candles, space heaters, and curling irons.
- Keep children away from radiators.
- Keep hot drinks out of young children's reach.
- Check the temperature of bath water before putting a child in the tub.
- Check smoke alarm batteries at least once a month.
- Keep a fire extinguisher in the kitchen.
- Don't let young children play in the kitchen while someone is cooking.

رقم الطوارئ
EMERGENCY NUMBER